BBRO winter conference report

Pest and disease review of 2013

Soil management workshops
TO THE POINT
DELIVERING HIGHER YIELDS

Not to put too fine a point on it, Stingray is the highest yielding variety available on the 2014 BBRO Recommended List.*
An excellent pedigree with lower bolting, it is the variety others look up to.

*Source – BBRO 2014 recommended list - Full data set at www.bbro.co.uk

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2014 season offers new opportunities...

The 2013 beet crop produced the third highest yield ever, despite the problematic late spring and associated establishment problems. The crop produced almost unprecedented late-season growth to end up averaging just shy of 70 tonnes per hectare. Once more the resilience of the beet crop prevailed and despite the very wet harvesting conditions virtually all the crop was delivered in good condition to factories.

As the drills roll out for the 2014 crop there will be a need to exercise caution where the subsoil remains saturated from winter rainfall. However, the potential for maximising yield is always there at the start of the season, and this issue of the British Sugar Beet Review contains a wealth of up-to-date information on how to extract the maximum from 2014 crop.

Following yet another highly successful BBRO Winter Conference, Colin MacEwan summarises the output from the many technical sessions and breakout seminars, which once more proved very popular with growers.

Mark Stevens looks at the pest and disease incidence in 2013 and forecasts the likely impacts for 2014, given the relatively mild winter. Debbie Sparkes has provided a very helpful review of current BBRO research work and charts the direction future work may take. Also in this issue the topics of soil management and strip-tillage are covered, together with reports from two international conferences attended by representatives of the UK beet sugar industry.

I hope you enjoy this year’s first issue of the Review and wish you another successful sugar beet crop in 2014.

Robin Limb
Editor

BBRO Summer Open Days Programme – 2014

Don’t forget to take advantage of the 2014 Summer Open Days which promise to provide an excellent opportunity to hear the latest technical presentations, as well as meet industry people and trade exhibitors.

All open days start at 12:00 noon and finish at 15:00. Invitations will be sent in early April from the BBRO.

13th May – Wissington
West Dereham, King’s Lynn

15th May – Cantley
Colby, Norwich

20th May – Newark
Bracebridge Heath, Lincoln

22nd May – Bury St. Edmunds
Stonham Aspal, Stowmarket
A strong all-weather performer in its field. And in yours.

Betanal® maxxPro

Consistent weed control through any season.

The weather may change drastically year on year, but you can always rely on Betanal maxxPro’s performance to keep consistent. It’s because its unique activation technology and formulation assures faster, more robust weed control, from season to season. Along with the added advantages of a more flexible spraying window and outstanding crop safety.

Maxx protection for your sugar beet crop that you can always rely on whatever the weather.

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Bayer CropScience
BBRO Conference 2014

The BBRO held its Winter Conference on Tuesday 4th February at the Peterborough Arena. This annual event was attended by an excellent number of growers and advisers with over 760 of the delegates registered. Again, this shows the industry’s appetite to gain knowledge, to improve yields and maintain a profitable crop for the future.

BBRO conference programme

The conference programme included updates on the core BBRO research programme. Areas of work were also showcased which BBRO is commissioning in the coming year, as Dr. Debbie Sparkes outlines in this issue of the British Sugar Beet Review (see page 11).

The conference programme was also designed to give a snapshot of what to look forward to in the future following engineering innovation and mapping techniques for sustainable soil health. These will all be important to help us build a competitive industry and meet the challenges following the removal of quotas post 2017.

The new Sugar Beet Reference Book was launched at the Conference to help growers gain access to BBRO’s latest advice, alongside benchmarking data on the actual crop performance and is a step change in the way that BBRO will communicate current best practice.

Guest speaker

Our keynote speaker, Adam Henson, gave an insight into his life as a tenant farmer, journalist and broadcaster. He gave a passionate and entertaining presentation on the importance of positively promoting agriculture to the younger generation and the country as a whole. He provided some examples from his career to date and also gave examples of how the media can influence and educate large numbers of the population. He stressed the importance of ensuring all involved in agriculture presented it in a positive way.

The presentations

BBRO research review

Dr. Debbie Sparkes – Nottingham University

Dr. Debbie Sparkes summarised the findings of her recent BBRO review of research priorities in crop production. She outlined how it was completed and how the priorities were identified.

In the second part of the presentation Debbie gave an overview of the first projects to be funded as a result of the process. This work will be part of an innovative collaboration between the University of Nottingham and the BBRO development team and will address three main areas:

- understanding and overcoming limitations to water uptake by the crop
- identifying rooting traits for optimal nutrient uptake
- improving establishment and early growth.
Novel research techniques will be used to allow a greater understanding of the limitations to water and nutrient uptake than has previously been possible. The collaboration with the University of Nottingham will also include a jointly-funded PhD scheme to train applied researchers who can both advance and communicate science effectively in the future.

Crop protection update – latest findings and future challenges
Dr. Mark Stevens – Dr. Gill Champion

In this paper, Dr. Gill Champion and Dr. Mark Stevens reviewed the crop protection challenges that UK growers faced in the last year. They also described some of the research findings from this current programme of work.

During the presentation, a large show of hands from the audience highlighted the challenge we all face with blackgrass control. Gill outlined her current research results from her BBRO funded work on this weed.

BCN was again highlighted as an area that we need to continue working on with breeders to ensure a good supply of resistant high-yielding varieties is available in the pipeline. Mark outlined some of the outcomes from our innovative box work and field-strip trials on the pest, which we have carried out on BCN over the last four years. He also highlighted some of the rotational issues involving oilseed rape and other brassica species on the build-up of these nematodes.

Mark then presented a summary of this year’s crop protection programme highlighting the current importance and potential challenges to the use of neonicotinoid seed treatments within the crop. He concluded this section with overview of this year’s rhizomania situation. He identified several existing or novel diseases that could become more problematic to UK growers if cropping patterns or climate change influence the distribution and severity of these issues. He described how we can learn from the experiences of growers across Europe and North America to tackle these potential problems and how BBRO is well connected and represented within some of the international research bodies across Europe.

Views on sugar beet production and industry future
Andrew Ward – Roy Ward Farms

Andrew, who farms 740 hectares at Glebe Farm, Leadenham, gave us a personal insight into how sugar beet is produced on his farm. He described how all of the agronomic and operational aspects are managed. He specifically covered the importance of soil cultivations, crop establishment, nutrition, weed control, pest and disease control, harvesting, storage and delivery.

Attention to detail and efficient management of all of these are Andrew’s key objectives to produce maximum yield. Cost control is also essential and Andrew showed how costs are minimised to deliver maximum financial return.

He explained his vision of how the sugar beet industry is evolving and what aspect of it he sees as important for a healthy future. He gave his thoughts on how the ‘partnership’ between growers, British Sugar and the BBRO needs to be strong and dynamic for the benefit of all in the industry. Andrew also shared his vision of how in future growers will work more closely together to effectively adopt new growing techniques.

Precision farming – the future
Prof. Simon Blackmore – Harper Adams University

Prof. Blackmore outlined the concept of precision farming by showing how smarter machines could use the minimum amount of energy to cut out wasted energy and reduce costs. Developed agriculture uses massive amounts of energy in a myriad of forms, from the energy associated with chemicals used to control pests and diseases, through fertilisers, to the tractors themselves and the fuel to power them.

Currently, tractors and associated machines are increasing in size due to economies of scale, but as machines get bigger, the opportunity to work the fields gets smaller due to the fragile nature of the soil when wet. Simon described how this cycle can only be broken by making the machines significantly lighter so as not to damage the soil and thus expand the available operational weather windows.

He left us with the question, how do we overcome all of these problems and take advantage of new technologies? He shared his vision about how to develop a completely new system by looking at all the operations needed to establish, care for and harvest crop plants and identify ways to minimise inputs. This change could result in a new engineering ‘blue revolution’ for agriculture.

Controlled-traffic farming and sugar beet
Tim Chamen – Controlled-traffic farming

Tim Chamen’s controlled-traffic presentation provided an overview of the threat that can be posed by randomly imposed machinery compaction on soils and how seedbeds are compromised, particularly those established in the spring. Tim described how the implementation of a controlled-traffic system would add value and improve the stresses on the subsoil ameliorating the ways in which seedbeds are compromised, particularly those established in the spring.
He covered in detail the change in mindset needed, and reviewed the associated requirements for crop establishment systems, machinery matching, long-term planning and adoption of a global navigation satellite system (GNSS). He then gave examples of C-TF systems in both the combinable and root crop sectors with challenges for the latter being identified. He also included a case study for C-TF adoption in a sugar beet rotation for a farm in Essex, which is planning a 6/12 metre OutTrac system. This will be a non-plough regime that will allow them to keep machinery on track before and after, but not during, the sugar beet harvest. Tim provided a glimpse of what he sees as the next generation of C-TF machinery, which will be able to accommodate root and vegetable crops.

Soil management techniques
Dr. Andy Neal – Rothamsted Research

Dr. Andy Neal opened his presentation by explaining how the importance of high quality production is dependent upon a healthy functioning soil and agricultural practices which conserve important environmental services such as nutrient cycling and pesticide degradation.

Although a number of soil models exist, Andy explained that understanding the effects of soil management upon the microbial component of soil is not straight forward, because the vast majority of microbes in soil are difficult to cultivate and study. However, sequencing of nucleic acids (DNA, RNA) extracted from soil can provide unique insight into the effects of different soil management strategies upon the structure of microbial populations.

Andy then went on to give a detailed explanation of metagenomic (the study of the variation of species in complex microbial samples) analyses of soil microbial populations, which provide a wealth of genetic information associated with tens of millions of sequences generated per metagenome. He explained how the technique is a powerful tool with which to assess the biodiversity associated with key microbially-driven processes, such as mineralisation of complex carbon compounds, or cycling of key nutrients such as nitrogen and phosphorus.

Andy demonstrated by the use of a ‘family tree’ the power of these novel metagenomic approaches to reveal the effects of different land-management practices upon the biodiversity of micro-organisms associated with the cycling of nitrogen and phosphorus. He was able to develop this work by using the long-term rotational field trials at Rothamsted Research at Harpenden. This highlights the value of having access to these types of long-term trials, and the importance of maintaining this precious resource.

Latest weed control strategies in the US
Prof. Mohamed Khan – North Dakota State University

Prof. Mohamed Khan gave us an informative and entertaining presentation. He began by outlining a brief history of sugar beet production within the US and then summarised some of the factors that limit sugar beet production in the country. One of the key factors he covered was weed control. Conventional herbicide usage at full doses of herbicides or multiple applications of reduced rates to smaller plants, was useful, but still required cultivation/hoeing for season-long weed control. Roundup Ready sugar beet is a technology which has been rapidly adopted and has facilitated adoption of reduced tillage and lowered fuel costs, whilst allowing greater flexibility of timings of the application.

Mohamed showed examples of the costs of the different production systems using Roundup Ready beet. He then went on to highlight one of the disadvantages of over-using glyphosate: the development of resistance in weeds, such as Kochia scoparia (Belvedere summer grass or Mexican burningbush) and Amaranthus spp., such as palmer amaranth.

He highlighted the advantages, challenges, ethics, and the role of education in understanding and using ‘technology’ to improve food, feed, fibre, and fuel worldwide.

Breakout sessions held throughout the day on the following:
- Future BBRO communications – Paul Bee and Lynsey Swailes
- Research and education priorities for the BBRO – Colin MacEwan
- BBRO investigation into seed emergence issues in 2013 – Mark Stevens
Was there any pest or disease pressure in sugar beet during 2013?

The cold, prolonged winter of 2012/13 ensured that many of the traditional problems that impact an early sown sugar beet crop were of little or no importance during 2013/14. The first week of March, when a small proportion of beet was sown before the cold, snowy conditions returned during Easter, was the exception but the warmth in this period had little overall effect on pests and diseases. The constant sub-zero temperatures killed many of the overwintering aphids and fungal spores alike. However, as with previous years, there were always issues, that BBRO closely monitored directly and through contacts with agronomists, growers and the British Sugar area manager team. Some problems may warrant further investigation or control. This article summarises sugar beet pests and diseases during the 2013 season and key pointers as to what we might expect to see in 2014.

Aphids and seed treatments

The cold winter killed most overwintering aphids, so the virus yellows forecast for the end of August was low for all areas regardless of the use of seed treatments (Table 1). In addition, the cool start to the spring meant that any surviving aphid populations were slow to build up and, the migrations that did occur were smaller and later in the season than usual. An exception to this was the monitoring site at Fulbourn, Cambridgeshire, where winged Myzus persicae numbers reached a peak of 800 in late June. This shows how aphid populations can develop quickly if they are given favourable conditions in early summer. However, only 0.2% of the National crop area was affected by virus yellows as determined by field assessments in August.

It could be argued that seed treatments for virus yellows control were an unnecessary expense for growers in 2013 but, it should be remembered, that there are no effective alternative aphicides registered for spraying against peach-potato aphid (M. persicae) control in beet due to the current aphicide resistance mechanism(s) in the pest. The seed treatments also control many other pests such as the soil pest complex, capsids and early leaf miner activity. Therefore, their

Table 1 – Virus Yellows Forecast for 2013.

<table>
<thead>
<tr>
<th>Factory area</th>
<th>Option</th>
<th>Virus yellows (%) on sowing dates of</th>
<th>Usage of pesticide-treated seeds</th>
<th>Mean temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>15th March</td>
<td>30th March</td>
<td>15th April</td>
</tr>
<tr>
<td>Bury</td>
<td>Without pest management</td>
<td>1.63</td>
<td>2.16</td>
<td>3.18</td>
</tr>
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<td></td>
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<td>0.11</td>
<td>0.13</td>
<td>0.15</td>
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<tr>
<td>Cantley</td>
<td>Without pest management</td>
<td>1.06</td>
<td>1.38</td>
<td>1.99</td>
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<tr>
<td></td>
<td>With pesticide-treated seeds</td>
<td>0.09</td>
<td>0.11</td>
<td>0.12</td>
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<tr>
<td>Wissington</td>
<td>Without pest management</td>
<td>1.63</td>
<td>2.16</td>
<td>3.18</td>
</tr>
<tr>
<td></td>
<td>With pesticide-treated seeds</td>
<td>0.12</td>
<td>0.14</td>
<td>0.16</td>
</tr>
<tr>
<td>Newark</td>
<td>Without pest management</td>
<td>2.08</td>
<td>2.92</td>
<td>4.67</td>
</tr>
<tr>
<td></td>
<td>With pesticide-treated seeds</td>
<td>0.12</td>
<td>0.14</td>
<td>0.16</td>
</tr>
</tbody>
</table>
use remains important to protect and maximise sugar beet yield even when virus yellows levels are low.

Variable numbers of black aphids were also found in some crops but, at the same time, there was an increasing population of beneficial insects too, so there was no need to treat any crops for these aphids. Spraying to control black aphids will impact on beneficial insects leaving the crop vulnerable to later infestations of other pests such as spider mite, which was certainly evident in late summer due to the warm, dry conditions.

**Downy mildew**

Downy mildew was found in a number of crops from May onwards, usually at very low levels, although occasionally up to one in ten plants were affected. It appeared on plants from the 6-8 leaf stage onwards and the fungus could be found throughout the season; early cool conditions will have favoured its development. Early infection can lead to stunting of leaves (Pic. 1), hollow crowns or cracking of the roots leading to secondary root rots and the oldest affected leaves can become yellow and brittle and easily confused with virus yellows symptoms (Pic. 2). Currently there are no tolerant/resistant varieties or other control strategies available. In 2014, the BBRO will start a new project investigating downy mildew and possible control strategies once a reliable inoculation procedure has been developed in the laboratory and tested in the field.

**Leaf miner (early and late)**

Leaf miner eggs were found in several crops early in the season and, although nothing can be done to treat the eggs, once they hatch the seed treatments will control the larvae effectively for the first 14 weeks of the growing season.

More concerning is the rise of late leaf miner activity, where serious canopy damage has been observed from September onwards, often after fungicide(s) have been applied to the crop. The worst cases have tended to be found on coastal beet in Suffolk and Norfolk and around the Wash, although serious attacks have occurred inland too. It can lead to loss of the canopy (Pic. 3) leading to leaf re-growth and a potential negative impact on yield performance. Similar reports have been received from elsewhere in Europe, particularly from the Netherlands, and it remains a concern for yield, root storage and loss of canopy for early frost protection on later lifted beet. Control options are limited, but appropriate pyrethroids offer some protection, although the timing of their application may be problematic when trying to coincide with egg hatch and initial larval activity.
Rhizomania

2013 was the first year where the entire UK crop was sown with varieties that were partially resistant to rhizomania. The good news, in part helped by the cold spring, was that there was only one new case of the disease, and there were no further cases or spread of the more aggressive AYPR strain of rhizomania (Pic. 4). BBRO trials continue to evaluate new varieties for their effect on the build-up of such aggressive strains and, where possible, their performance in affected fields (Pic. 5).

Silver Y caterpillars

Low level activity of Silver Y caterpillars was recorded, particularly in the Newark factory area in June and July. These field observations were supported by the pheromone traps that were used in selected fields to attract and capture the adult moths. In 2013, it was primarily first generation caterpillars that were recorded in fields, although some second generation eggs were found. At present, the threshold for control with pyrethroids remains at five caterpillars per plant.

Foliar diseases

With 49 ground frosts recorded in February and March, the powdery mildew forecast was very low for 2013 (9%), due to the cold weather suppressing the overwinter survival of spores. Even with conducive conditions through the summer (i.e. warm and relatively dry,) very little powdery mildew was observed nationally, and would have been controlled by broad-spectrum fungicide applications. Initially rust was also slow to develop, but it certainly increased in prevalence during the autumn and reached up to 35% of canopy cover in late October on untreated plots of the BBRO fungicide trials in Suffolk. In addition, low levels of ramularia, cercospora leaf spot and phoma were all found during the autumn months.

All crops should receive a full rate fungicide at the onset of foliar diseases to protect the canopy and maximise yield potential. However, it is important to avoid spraying crops during periods of wilting, although this is difficult to achieve in prolonged periods of drought! Always check the label to ensure the correct volume of water is used. Details of BBRO fungicide trial data will be found in the summer issue of the British Sugar Beet Review.

Beet Cyst Nematode (BCN)

Patches of BCN were seen in crops from June onwards and several samples were sent to the plant clinic for confirmation. Oilseed rape is an excellent host for BCN (Pics. 6 and 7) and can build up the pest populations very quickly. Fortunately, there are now excellent tolerant sugar beet varieties available (see Variety article in next issue) and the BBRO is investigating the use of catch/biofumigant crops to manage future BCN populations. These studies have only just begun, but will be reported in a future British Sugar Beet Review article. If BCN is present, then use of BCN tolerant seed is important. Your British Sugar area manager can arrange soil testing if BCN is suspected on farm.
Root rots
All three root rots (e.g. violet root rot, rhizoctonia and fusarium) were identified from field samples sent to the plant clinic during the course of the season. Violet root rot certainly made an appearance in late autumn, particularly in south Lincolnshire on the lighter sandy soils prone to this disease, although just-in-time harvesting and delivery to factory from affected fields ensured that its impact on yield was kept to a minimum.

The greatest number of fusarium samples was received from the Cantley factory area, where many beet crops suffered from drought and were under stress for much of the summer. This disease is an opportunist and usually relies on damage to the crown or tap root for the pathogen to gain entry into the beet. Rhizoctonia was also seen and is certainly a disease to watch in the future, particularly for those growers with maize in the rotation as there are strains of rhizoctonia (anastomosis groups) that are capable of infecting and multiplying on both crops.

Larger pests
Birds (e.g. wood pigeons) and larger mammals continued to graze some crops during the early stages of the season. Slow growth during this time exacerbated the problem as affected plants were slow to grow away from any damage. However, as long as the growing point remains intact, then the beet will recover. In an attempt to limit damage from rabbits, netting and even electric flexi-netting can be effective in reducing rabbit damage.

Thoughts for 2014
At the time of writing, the winter of 2013/14 remains wild, wet and windy but, in stark contrast to 2013, temperatures are extremely mild. Therefore, all pests and diseases that rely on warmer conditions to survive through the winter will be potential problems for sugar beet in 2014. Around 4% of the UK crop is still grown without an insecticide seed treatment, and this is mostly where a granular nematicide is being used to overcome docking disorder caused by free-living nematodes. Monitoring all crops for pest and disease attack, particularly other soil-pests and aphids, will be important; the virus yellows forecast for 2014 is highlighted in Table 2. Foliar diseases such as mildew will need to be assessed too, and the BBRO will continue to maintain a ‘watching brief’ for any new diseases, such as the leaf disease stemphylium which is close by on the continent. (More details on this disease will feature in the summer issue.)

Plant clinic
The BBRO plant clinic will be fully operational throughout 2014 (Ref. 1). However, wherever possible, we encourage samples as pictures or comments via email, details available at www.uksugarbeet.co.uk. Where a physical sample is required, the BBRO ask that samples are sent in sealed plastic bags with sufficient moisture in the package to ensure that any plants can survive for several days as they might not be seen immediately. Where plants alone are sent, they can be wrapped in damp tissue paper and sealed in a bag. When soil is sent, please make sure the soil is damp enough to help sustain any seedlings. It is important that all samples are submitted with a fully completed Plant Clinic submission form, otherwise we cannot guarantee that we can assess the samples. These forms are available from the web pages.

Reference

Table 2 – Virus Yellows Forecast for four separate factory areas in 2014.

<table>
<thead>
<tr>
<th>Factory area</th>
<th>Option</th>
<th>Virus yellows (%) on sowing dates of</th>
<th>Usage of pesticide-treated seeds</th>
<th>Mean temperature</th>
</tr>
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<td></td>
<td></td>
<td>15th March</td>
<td>30th March</td>
<td>15th April</td>
</tr>
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<td>Bury</td>
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<td>76.5</td>
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<td>With pesticide-treated seeds</td>
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<td>2.51</td>
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<td>Wissington</td>
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<td>76.5</td>
</tr>
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<td>With pesticide-treated seeds</td>
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Pic. 7 – BCN cysts on oilseed rape roots.
A summary of the BBRO research review of crop production

In 2013, BBRO started a process of reviewing future research priorities for the UK sugar beet crop. The first review focussed on research relating to crop production and was reported to the BBRO Research and Development Board in April 2013. Subsequently, a second review has focussed on crop protection and was presented to the Board in February this year. This article summarises the key findings of the crop production review and describes the first projects that have been funded as a result. A future article will summarise the findings of the crop protection review.

Water

It may seem surprising, given the record rainfall that we have received this winter, but water availability is the most important limitation to sugar beet yield in England (Ref. 1). Loss of sugar yield to drought is 10% in an average year, but can exceed 25%. While many researchers have found roots of sugar beet at 1.5 m and deeper, most reports indicate that the majority of water taken up by the crop is from the top 60 cm of soil. It has been suggested that, deeper in the profile, sugar beet roots tend to pass through existing pores and are therefore clumped together, meaning that they cannot access all the available soil moisture.

While profitable responses to irrigation have been demonstrated, the irrigated sugar beet area in England remains small due to limited water availability, lack of irrigation infrastructure and the priority given to high value crops, such as potatoes. Therefore, improved water uptake and increased water use efficiency (WUE) are more likely targets for yield improvement. There is evidence of genetic variation in WUE (Ref. 1), which may facilitate breeding for improved WUE in the future. A more immediate target is better use of available water, particularly in the deeper layers of the profile. Research is therefore recommended to understand the limitations to water uptake by the sugar beet crop and how these can be overcome.

The sugar beet crop is known to wilt, even when soil moisture is available, if water uptake cannot match demand (Pic. 1). While other plant species can quickly close their stomata (leaf pores through which water evaporates) to conserve water, sugar beet plants are less responsive. Varieties differ in their susceptibility to wilting (Ref. 1) suggesting that there may be genetic variation in stomatal control. Fundamental research to understand stomatal control in sugar beet is therefore recommended.

Soil compaction

Topsoil compaction increases time to emergence and reduces plant population, both of which impact directly on sugar yield. Compaction deeper in the soil profile restricts root growth, limiting water and nutrient uptake. Subsoil compaction is therefore a serious threat to long-term productivity as it persists for many years. While subsoiling can lead to significant yield
traits associated with optimal nutrient uptake would provide a screening tool to facilitate future breeding programmes.

**Plant population**

The international scientific literature supports an optimum plant population of between 75-90,000 plants/ha but this is not always achieved due to poor or patchy establishment (Pic. 4). There is a need for research on improving establishment of the beet crop to allow growers to reliably achieve their target plant population and hence optimise yield.

**Crop nutrition**

All UK and international literature points towards an optimum N application of 100-120 kg/ha on mineral soils, with little adjustment for soil mineral N because nitrogen must be readily available in the top few centimetres of soil to promote canopy expansion. Despite these consistent findings, many growers are concerned that the current N recommendations do not allow them to optimise yield. The main role of nitrogen within the beet crop is to promote rapid canopy expansion and hence maximise light interception, and 120 kg N/ha is sufficient to build a complete canopy. Therefore, increased N application rates could only be justified if: 1) more N is required to maintain the canopy to later harvest dates or 2) new varieties of sugar beet are released with more upright canopies meaning that more leaf area would be needed for canopy closure.

Research has found that applying N fertiliser in the summer has no impact on canopy efficiency (Ref. 3). More recently, the use of a two (and on some crops three) spray fungicide programme has become commonplace, this has increased canopy persistence. Research is recommended to understand the physiological response of sugar beet to fungicide application and whether the use of fungicides has any impact on crop N requirements. (Pic. 2)

N fertiliser recovery is an area that should also be considered. Most N fertiliser is applied to the beet crop at planting or shortly thereafter when the rooting system is very small, and hence N is prone to leaching. If heavy rain is experienced shortly after N application, there is the potential for significant N loss and, with the limitations of RB209, growers are not permitted to apply more N to compensate for leaching losses. N application technologies that minimise losses and maximise uptake could potentially lead to improved yields by promoting early canopy expansion.

There is large genetic variability in sugar beet rooting properties that are important for nutrient uptake (Pic. 3). Greater understanding of the rooting

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Pic. 2 – Differences in canopy structure. Photograph courtesy of Simon Kerr, NIAB

Pic. 3 – Three sugar beet varieties grown for 14 days in the same conditions showing variation in rooting depth and lateral root growth.
Early canopy growth

The importance of early canopy closure to maximise light interception, and thereby yield, is well understood. As early canopy growth is so important, and strongly related to temperature, the impact of cool temperatures at different stages of growth on subsequent canopy expansion would be worth investigating. If the crop emerges well but is then checked by cold weather, how does this impact on future crop growth?

Radiation use efficiency

Because sugar yield is directly related to light interception, the efficiency with which light is converted to biomass, and ultimately sugar (radiation use efficiency), is a target for yield improvement. Recent research has shown that there are consistent differences in radiation use efficiency (RUE) between genotypes (Ref. 4) indicating the potential to further improve RUE of sugar beet, and this remains a target for breeders. Linking back to changes in canopy structure, research to explore whether canopy structure has changed with the introduction of new varieties, should also explore any relationship between canopy structure and RUE.

Rotations and cultivations

The impact of sugar beet on the whole-farm rotation is important, both in terms of soil structure and fertility and pest and disease considerations. It is therefore recommended that the BBRO collaborate with other levy-funded bodies on long-term rotational studies.

Frost tolerance

Some obvious differences between sugar beet varieties in their tolerance to frost were observed in 2011 (Ref. 5) but these may have been confounded by differences in resistance to rust and hence canopy size. There is ongoing work to determine whether differences between varieties are consistent. If so, this could assist farmers in deciding which varieties to harvest first and also provide selection traits for breeding programmes.

Autumn-sown beet

It has been estimated that moving to autumn-sown beet would increase yield potential by 26% (Ref. 6) but that this is likely to be offset by increased weed, pest and disease
problems. Work to compare modelled results for autumn-sown beet with field observations is required when bolting resistant material is available, and the work should be extended to whole-farm considerations (e.g. autumn workload, weed, pest and disease control).

Benchmarking
Benchmarking has been found to improve grower performance in a number of agricultural sectors. BBRO have previously invested in a benchmarking project and a web-based tool was developed which allows growers to compare actual with potential yield for their own crops. Further investment is recommended to make this potentially valuable tool available to UK sugar beet growers. In addition, the sugar beet growth model, which underpins the benchmarking tool, needs to be kept up-to-date with information related to new varieties. Also, expertise in use of the model should be extended to a wider group of people.

First projects based on the research review
Three inter-related projects, focussed on soil-plant interactions, have been funded as a result of the crop production research review. Fundamental research, using the latest scientific techniques available, is linked to field experiments that will investigate how growers can improve establishment and water and nutrient uptake by their crops. The work is collaboration between the University of Nottingham and BBRO.

The three projects are:
1. Evaluating and mitigating limitations to water uptake
   X-ray CT techniques will be used to identify constraints to water uptake by the sugar beet crop. Once those constraints have been identified, field experiments will explore strategies to overcome those constraints, thereby increasing water availability for crop growth and increasing yield.

2. Identifying rooting traits for optimal nutrient uptake
   This project will evaluate the diversity in rooting traits in UK and European sugar beet germplasm and explore relationships between rooting traits and nutrient uptake. The aim is to develop a rapid rooting screen for nutrient uptake efficiency. Allied to this work, and informed by the rooting traits associated with improved nutrient uptake, will be field experiments to evaluate nutrient placement techniques.

3. Improving establishment and early growth
   The third project will investigate soil physical properties at drilling (e.g. aggregate size, bulk density, shear strength, moisture content) and their relationship with emergence rate and final plant population. Data collected from a field survey across a range of soil types, will be used to develop a model that uses soil physical properties, plus environmental information (e.g. soil texture, temperature etc.) to predict establishment. The model will be validated across soil types and seasons before being used to develop a tool that growers can use in-field, to predict establishment rate, based on seedbed quality. The tool will facilitate grower decisions concerning population; whether to adjust seed rate or whether to improve establishment by, for example, carrying out additional cultivations.

In addition to the research projects detailed above, the University of Nottingham and BBRO have agreed to jointly fund a number of PhD students who will work on the more fundamental areas identified in the review, such as understanding stomatal control and improving radiation use efficiency. This joint venture will aim to identify and stimulate the next generation of applied scientists to address topical and timely research issues, using the latest available technologies, to maximise future yield potential and ensure that the UK remains a leading centre for sugar beet R&D.

References

Fig. 1 – (a) Measurement of soil moisture content throughout the soil profile using a theta probe, (b) high capacity X-ray CT scanner.
Beet Cyst Nematode sampling: test for a pest

Beet Cyst Nematode – *Heterodera schachtii*

Beet Cyst Nematode (BCN) is a soil pest that has received an increased focus over recent years, in part encouraged by the recent availability of tolerant varieties. BCN can seriously impact on sugar beet yield; it has been shown that some years it can reduce beet yields by up to 75% in severe situations (Ref. 1). This yield loss can be largely mitigated by accurate use of BCN tolerant varieties.

The BCN lifecycle has a series of stages. Starting as eggs in the soil, the pest hatches in response to root exudates from the host plant, and the young nematodes invade the root hairs. The female nematode will grow on the root hairs to form a cyst which falls off and releases eggs and larvae back into the soil. It can go through multiple lifecycles within a year if conditions are suitable and eggs can survive for a number of years.

Tolerant varieties form the main control method for BCN. Potential yield benefits from choosing the correct seed are very large. While the benefits vary year to year, in years when conditions are most conducive to the pest, the increase in yield from selecting tolerant varieties can be over 50% (Ref. 2). This could be worth £727/ha extra in the most extreme circumstances.

The soil sampling process identifies the amount of BCN present in the soil before drilling, to enable appropriate varieties to be chosen. This article explains how the BCN soil sampling process works and how it can be used to inform variety choice to ensure increased beet yields.

**When and where to sample**

Occurrence of BCN is rarely uniform across a farm or within a field. Even across similar soil types and cropping histories there can be differences, this makes it difficult to predict where it will occur. The only sure way of identifying a field as containing BCN is either through soil testing, or to have had the symptoms confirmed when the crop was previously in sugar beet.

**Recognising in-field symptoms**

BCN often appears as patches within the crop. Foliar symptoms are often first seen as a yellowing of the foliage of the crop, while below ground root growth is stunted and bearding can occur, creating vulnerability to drought. On close inspection cysts can be seen as small, lemon shaped growths, about the size of a grain of sand, on the root hairs. Cysts can be white to brown in colour and will squash between the nail and finger when pinched.

While BCN can be found anywhere across the beet growing area, some places are at a much higher risk than others. Higher risk soil types are loamy sands having high organic content. The high risk area has changed little over the lifespan of the sugar beet industry: confirmed positive results from the current British Sugar sampling service being concentrated in areas where the pest was most common in surveys completed in the 1950s.

The soil sampling team at Wissington have been carrying out BCN testing on growers’ farms since 2009, with annual totals ranging from 26 when we first started the service to 195 a couple of years later; in some cases complete farms have
Method for Beet Cyst Nematode extraction and egg counting

Samples are sent to a specialist nematologist for BCN to be identified and counted. The soil sample is thoroughly mixed and a representative sub sample is removed and dried. Any organic material, including the cysts is extracted using sieving and flotation. All the organic material is then placed onto a turntable under a microscope. Through this microscope, cysts identified as being Beet Cyst Nematode are viewed and picked out of the sample. The cysts are then crushed to release the eggs which are counted using a specialised counting chamber.

been tested. BCN testing has also been carried out in the Bury St. Edmunds factory area, ranging here from 47 to 107 tests per year.

Sampling costs in the last few years, with the help of sponsorship from seed companies, KWS, Limagrain, Strube and Syngenta, have been reduced to £35 per sample if four or more are taken. Just a 0.4% increase in yield will cover this cost, even if sampling every 4 ha. The increase in yield from tolerant varieties can be much larger, in the most extreme cases over 50% (Ref. 2). The yield penalty for using BCN varieties where the pest is not present is 6% compared to the highest yielding conventional varieties (Ref. 3). With such an effect on yield either way it is crucial to make sure that the correct variety is selected. The costs of choosing according to the results of the BCN test can be recouped many times over in a single crop.

BCN – Field sampling method

An overview of the sampling process is useful background to an understanding of how BCN is identified. To achieve a representative random sample from a field, a grid pattern is used across the field area; this will produce a sample for a 4 ha block of land. Any potential ‘hot spots’ such as previous areas where symptoms have been found in the past can be targeted if necessary.

The ideal depth for sampling is the top 0-20 cm, and sampling is easier to achieve when the soil is moist. It is much more accurate to take many small cores rather than a few large ones. Soil cores are extracted by the soil sampler every 20 metres along the grid pattern within the field. This produces a sample composed of 25 to 30 separate soil cores per hectare, giving a total of about 100 samples per 4 ha for analysis. These are collected in the same receptacle and mixed thoroughly, but gently as the cysts are very fragile; gentle mixing ensures they do not get damaged.

A mixed sample produces the representative composite sample for the 4 ha block. When the sample has been thoroughly mixed, soil is extracted and placed into a sample bag, labelled to clearly identify where the sample was taken on a field map.
Results are expressed as viable eggs per gram of dried soil. The results are plotted on a field map according to the marked area from which each sample of 100 soil cores was taken.

Interpretation of results

Results obtained from this sampling process should be used in conjunction with other information, such as field history, rotation and soil type to decide the appropriate course of action.

British Sugar test egg counts 2009-2013

The majority of positive results are counts of four or fewer eggs/g of dried soil. Of the 198 positive results taken by Wissington and Bury soil sampling service, 115 had scores of 1 to 5 eggs/g, and 24 samples had scores at very high levels greater than 20 eggs/g. This information is useful to consider where your results fit within the sample range and give an idea of the relative severity of infestation.

The survey highlighted the large numbers of lower level infestations detected by sampling.

Field history

Recording any noticeable symptoms in previous crops will identify where the highest levels of the pest are located. The severity of symptoms will vary year to year depending on weather conditions; in a hotter, drier year the symptoms described above will be more obvious. If high levels have been seen in a crop there is very likely to be some level of risk from BCN next time that beet is grown on the field.

Rotation

Cysts in the soil can survive for many years, but will decline in number by approximately 40% each year (Ref. 4). A closer rotation of host crops increases the risk of pest levels building up. The other predominant host crop most likely grown within the beet rotation is oilseed rape. In addition to this, other Brassicas, weed beet and some weed species also host BCN. A significant number of growers farm a four year rotation containing both beet and oilseed rape which gives the increased possibility of high level being present because a host crop is grown every other year. In a tighter rotation the need for a tolerant variety would be even more likely to be beneficial.

Soil type

High organic content soils and sandy soils are the soil types where BCN is more common. However, a low level of BCN can have a greater effect on yield on sandy soils compared to organic soil types. BCN trials work in 2011 showed that at levels of BCN at 2 egg/g there was little difference in yield between conventional and BCN-tolerant varieties on an organic soil type at Pondersbridge, but at the same level there was a difference of over 10% yield on loamy sand at Shropham (Ref. 2). Thresholds for changing to BCN-tolerant varieties are best discussed with your British Sugar area manager as the decision will depend on a combination of these factors.

Variety selection

Since the first BCN-tolerant variety in the UK, Fiorenza, was released by KWS for the 2009 crop, the varieties available to combat the pest have further improved. The yield gap between the latest BCN-tolerant varieties and the mean of the control varieties on the recommended list for 2014 has decreased to 4% yield difference in the absence of BCN (Ref. 3). Though small, this difference in yield is sufficient to warrant the avoidance of a tolerant variety if BCN is not present.

The other benefit of selecting BCN tolerant varieties is that they also reduce the level of replication of cysts. Thus, when the rotation returns beet to that field then the level and damage from the pest can be reduced. Field and box trials carried out by the BBRO have shown that the increase in BCN egg count from before to after a beet crop (Pf/Pi number) can be 2 or 3 times for tolerant varieties in comparison to 7 times for non-tolerant varieties (Ref. 5). This will help manage the population, and increase yield for future crops.

The most recent BCN-tolerant varieties to be on the recommended list for the 2014 crop are Mongoose and Pamina. These show a further increase in yield on the varieties from the previous year (Table 1). Mongoose and Pamina yield 4.2 and 3.2% more relative to control varieties than both Pitbull and Thor (Ref. 3). In addition to this, Pamina has the lowest early-sown bolters score of any BCN-tolerant variety that has been listed in the UK. New genetics continue to improve the tools available for managing the pest.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Adjusted tonnes % of (c)</th>
<th>Early-sown bolters/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thor</td>
<td>91.8</td>
<td>281</td>
</tr>
<tr>
<td>Pitbull</td>
<td>91.8</td>
<td>451</td>
</tr>
<tr>
<td>Mongoose</td>
<td>96.0</td>
<td>580</td>
</tr>
<tr>
<td>Pamina</td>
<td>95.0</td>
<td>184</td>
</tr>
</tbody>
</table>

BCN varieties continue to improve in yield performance compared to mainstream varieties.

SUMMARY

Soil testing is a very useful tool for identifying the most appropriate varieties to select to maximise yields. Growers should consider if their farm might be at risk of BCN and whether testing gives important information on their fields. If growers have identified BCN in their crop, or if they are within the higher risk area identified by our soil testing, then checking the level of infestation is a good idea. Soil testing results can be used by the grower in conjunction with other information to make an informed decision on variety choice for each individual field and, ultimately, lead to higher yields and a more profitable crop.

References

2. 2011 BBRO BCN field trials.
3. 2014 BBRO Recommended List.
4. nematode.unl.edu/extpubs.wyosbn
CIBE technical and reception control committee in Finland
November 2013

CIBE (International Confederation of European Beet Growers) represents sugar beet growers from 18 European beet-producing countries; this includes 160,000 growers from 16 EU countries (Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, the Netherlands, Poland, Romania, the Slovak Republic, Sweden and the United Kingdom) as well as 240,000 growers from 2 non-EU countries (Switzerland and Turkey).

The 400,000 sugar beet growers represented by CIBE produce on average just less than 20 million tonnes of white sugar per year from around 2 million hectares. This sugar is intended mainly for the 600 million inhabitants of the CIBE member countries.

The technical and reception control committee’s remit includes issues related to the relationship between growers and processors and the study of all the technical aspects of beet reception: equipment, methods and conditions. It meets in one of the member states every other year. In November 2013 the meeting was in Turku in Finland.

These meetings provide a platform for growers from different countries to exchange information and have a dialogue on the sustainable development of sugar beet production. In particular, it examines all the agronomical and technical problems concerned with beet growing, including environmental issues, which have become increasingly important, and the uses of beet in the production of green energy such as biomass and biofuels.

The meeting in Finland covered some wide and varied topics including among others:

1. Beet production in Finland
2. Automation in beet reception within CIBE member countries (including sample washing, saccharimetry and fixed crown tare)
3. Problems experienced with beet seed in 2012 and 2013
4. Agronomic progress of the crop (‘yield vs. sugar content’)

The attendees from the UK were William Martin, David Papworth and myself for NFU Sugar and Dr. Mark Stevens lead scientist for the BBRO. Summarised below are the discussions for these main topics within the meeting.

Beet production in Finland
An opening speech was given by Mr. Jari Koskinen, Minister of Agriculture and Forestry of Finland and then Mr. Pekka Myllymäki, the growers’ representative in Finland (who has been a beet grower for over 20 years) explained the profile of the industry in Finland.

Sugar beet is still grown in all areas where previously there were factories, although only one of the factories remains today. This means transport is a main concern for the industry due to the widespread production of the crop. The Finnish industry has shrunk following European Union reforms and is now less than 100,000 tonnes of sugar production annually. The average area of sugar beet per farm is 15 ha and yields average around 40 tonnes/ha, with the best producers only achieving highs of 50-60 tonnes/ha. With few arable options available to farmers in Finland due to the prevailing climate there are on average 180 growing days available for beet growing in Finland. Early sowing for sugar beet is considered to be mid-April.

Finish growers receive individual bonuses of €38.7 per hectare and if national quota is reached this becomes €40 per hectare. Their transport allowance is capped at 150 km. The average transport distance is 86 km.

The long-term aim for Finland is to increase sugar production and this point was also made by the Minister in his opening speech. They have a specific drive to attract younger and new growers to the crop.

All members of the meeting were invited to see the Säkylä sugar factory, which processes sugar beet for Finish growers, as well as to visit a local farm supplying beet to the factory. The Säkylä factory has 761 beet growers, delivering beet from 12,000 ha. The daily capacity of the factory is

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European findings, highlighting that the UK situation is more complex. (Ref. 1)

In general discussions between experts and delegates of the CIBE member countries present it was clear that, although all seeds supplied to farmers are subject to standard emergence tests, there was consensus that consideration should be given to further tests or changes to the standards would be appropriate. CIBE members were clear that the standards would need to remain suitable and be able to deliver the required quality of seed for growers. It was suggested that there could be some merit in carrying out stress tests on seed at colder temperatures using protocols to be agreed across the EU. CIBE decided to send a message to the seed trade reminding them of the widely varying temperatures that growers have to contend with in order to obtain good seed germination.

Agronomic progress

The main point in this paper was that all things being equal, root yield and sugar content are the two levers to increase sugar yields. The question was postulated by the presenters ‘What combination of these two levers is the most efficient?’ It was seen as a very important question since there is a negative correlation between root yield and sugar content; the illustrative example being that an increase of 1% in sugar content is associated with a decrease in sugar yield per hectare of around 6% to 8%.

Increasing sugar content rather than root weights was seen as having benefits as the higher the sugar content, the lower the beet transport cost. In addition it often facilitated slightly lower processing costs with no additional problems in sugar extractability up to 20% sugar. However, in terms of overall production gains sugar yield per hectare progresses faster by root yield increases than by sugar content increase because of the negative correlation stated above. The dilemma was therefore presented to the meeting that if sugar content were to be given priority, potential loss in sugar yields may be greater economically than potential gains by transport and process cost reduction. A number of growers in CIBE member countries remain in favour of root yield progress rather than an increase in sugar level.

The above is a brief synopsis of the meeting in November which provides a flavour of the topics discussed at this latest technical session. As with each of these meetings, the subject matter covered is wide ranging and it stimulates a lot of thought, discussion and sharing of ideas within the CIBE member countries helping us to all learn from each other’s experiences.

Reference

Beet growers attend soil management workshops

In December 2013, the BBRO and Smiths Gore announced a series of practical workshops designed to provide sugar beet growers with the opportunity to discuss soil management with a number of industry experts and fellow growers; the aim being improvement of the yield of sugar beet and other crops.

In preparation for these jointly-sponsored workshops, the BBRO and Smiths Gore initiated a programme of intensive training for all British Sugar’s area managers throughout the summer of 2013. This training took the form of a review of basic soil management issues, identified the key parameters affecting soil structure, and explored solutions to better soil management.

During the next few months, area managers will facilitate local discussion groups for beet growers. The topics for discussion and the format of the discussion groups will be decided by the group members; the overall aim is to provide sessions led by leading industry speakers, including visits to look at issues such as organic matter, precision farming and cultivation techniques. It is expected that each group will meet four times over the winter; initial events having taken place during September and October.

Cantley soil health meetings

At the first four meetings held in the Cantley factory area, growers discussed the potential topics and structure for
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future events; the intention being for the groups to determine the content of the training, thereby ensuring that ensuing advice was relevant to their farm and situation. These first meetings were led by soils expert Philip Wright of Wright Resolutions, sharing his wealth of experience in soil health and cultivation strategies.

Two meetings were held on 14th October 2013, one at the Stody Estate office in the morning, followed by an afternoon session at Honingham Thorpe Farms. The following day, two further meetings were held at Woodbastwick, near Norwich, followed by examination of soil pits dug on a neighbouring farm, studying the evaluation of soil profiles. An interactive discussion was held to highlight the cultural methods used by group members and their experiences.

After discussions at these initial meetings, and viewing the effects of compaction in the inspection pits, Philip Wright identified that all the groups were keen for a practical demonstration focussing on the correct tyre choice and ballasting to avoid smearing, compaction and the build-up of plough pans.

**Second meeting**

The plan was to demonstrate practically the effects of correct tyre choice and operating pressure to minimise compaction and wheel slip, both with tractors and trailers. This took place on Friday 22nd November at Shotesham Estates, near Norwich. The speakers were David Purdy from John Deere, and Andy Balfour from Michelin. The subjects covered: tyre selection (tractors and trailers), inflation pressures, axle loadings and optimum ballasting. Local John Deere dealer, Ben Burgess, supplied the tractors.

Two Cantley groups attended the morning meeting which was split into two sessions, followed by two in the afternoon. At the first session, Andy discussed and demonstrated tyre technology: construction of the tyre, how to identify each tyre’s abilities by the references on the tyre walls, sizing, optimum pressures for the axle weights, and fuel saving using the right pressure for the job. There was a practical demonstration comparing two tyres driven over freshly cultivated soil: a John Deere 6150R on Michelin Xeobibs 710/60R42 was compared with a John Deere 6140R on 650/65R42 tyres.

Rut depths and the difference in tyre print left by the two tyres were measured using boards pushed into the ground, and spray paint was used to delineate the foot prints (Pic. 1). The tractors’ axle weights were established and the tyre pressures adjusted. The advantage of the new tyre technology was shown in that only one tyre pressure was required for operating on both field and road, whereas the more conventional tyre design requires higher operating pressure on road than on the field, to prevent over-heating and tyre damage at speed.

The wider new-generation tyres have the advantage of lower operating pressures, and changes in design allow a bigger foot print with more cleats in contact with the soil giving greater transfer of power for traction. This was demonstrated by using flour thrown against the edge of
the tyre whilst stationary showing the number of treads in contact with the soil.

The difference in trailer tyres was also demonstrated using two trailers towed through freshly cultivated soil. One trailer was fitted with wider low pressure ‘550’s Alliance’ tyres, while the other was on ‘380’s super singles’ tyres. Much discussion took place on the importance of tyre choice and the damage to soil structure and the following crops caused by using incorrect trailer tyres.

In the second session David Purdy from John Deere, assisted by Carl Pteleen from Ben Burgess, discussed ballasting and setting up of tractors for maximum traction, with the aim of minimising wheel slip to avoid smearing and compaction. This was cleverly demonstrated with participation from the farmers using a model tractor and plough, two sets of kitchen scales, and calculators to complete a worksheet.

The next meetings requested by the groups were held on the 29th January at Barnham Broom Hotel. The subject was the health of the soil itself, with speakers discussing what comprises a healthy soil: its biological, physical and chemical components and identifying what a healthy soil can deliver. The value of composting, types available and the benefits composts can bring, along with an understanding of their use and the regulations attached. Also, the final speaker, Paul Brown of Frontier Agriculture, discussed catch cropping as a source of increasing organic matter, identifying the types of crop available and the practical aspects of establishing and timing their destruction to maximise the organic matter returned to the soil.

Paul presented catch cropping, primarily as a way of increasing organic matter and retaining nitrogen, but also to control/minimise Beet Cyst Nematode and Potato Cyst Nematode. Paul discussed the differing crop options and the practicalities of establishing and managing the crops. He also discussed the use of vetch as a source of nitrogen.

Editor’s note: A further article will appear in a later edition of the British Sugar Beet Review on this subject.

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Paul Brown addresses the workshop members.

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Recently there has been a lot of interest in exploiting strip-tillage for a number of crops, as a way of reducing the fuel and time costs of cultivation, and to achieve better plant establishment. Sugar beet has come into the frame, again with a view to reducing establishment costs but also as a possible means of reducing soil erosion, particularly on susceptible soil types.

The technique of strip-tillage was first conceived and developed in the USA, as an alternative to full-width
minimum tillage cultivation, and for direct drilling where, in some instances, a little soil movement would be advantageous. The equipment used has evolved considerably over recent years and can now be specifically designed to suit particular soil types. (Pic. 1)

In some parts of the world e.g. the mid-west USA, where winters and frozen soils can last as long as six months, all soil movement has to be done before the onset of the cold weather. In these situations, cultivating less than a full width not only saves time and money, but also leaves a rough tilth which will slowly break down over the winter.

For most Western European situations it is possible to cultivate at some point during the winter months; hence plough-based systems are still the norm, although non-inversion tillage is being exploited more and more as a means of saving costs and for environmental benefits such as a reduced carbon footprint and less impact on soil flora and fauna. However, given the variable weather conditions, flexibility in ability to switch from one system to another is a great advantage. Generally, in strip-tillage systems, cultivating and drilling are carried out as two separate operations so that full advantage can be taken of the highly accurate drills, specific to the crop being sown. However, for some crops, e.g. oilseed rape, drill units are now available which can be fitted to the strip-till machine. Another advancement making strip-tillage even more of a viable option is the use of Global Positioning Systems (GPS), which enable exact matching of the tillage and drilling passes in the prepared strip, avoiding the need for the accurate markers which were necessary in the past.

Strip-tillage, coupled with GPS, also facilitates controlled-traffic systems with permanent wheelings for fertilising and spraying, virtually eliminating compaction from random wheelings. This is another feature gaining interest amongst some growers.

Sugar beet

Being a root crop, sugar beet suffers greatly in poor or structurally damaged soils as yield potential is reduced as a result of fangy roots which increase harvester losses at lifting. Growers’ interest in strip-tillage for sugar beet stimulated the BBRO, in the mid 2000s, to commission The Arable Group (TAG) to trial new equipment developed in the USA. This equipment used disc coulters set either side
Following this encouraging experience in 2013, Velcourt decided to strip-till a further area to observe in detail during 2014. Other local farmers who saw what Velcourt had done are also having a look for themselves, by having part fields strip-tilled to compare with their current methods.

With a number of strip-tillage machines, adapted for European conditions beginning to appear, a lot of growers are looking at the concept, attracted by the financial and environmental benefits.

Hopefully, there will be a lot more to look at and follow in 2014 as interest increases and the findings of Dr. Morris’s review for the BBRO are made available this summer.

Experiences in 2013 and beyond

Several growers north of Peterborough have been considering how they could utilise the strip-tillage technique. One farm that took the plunge was Littleworth Estates, managed by Velcourt at Deeping St. Nicholas, near Spalding, Lincolnshire. Growing sugar beet on some of their heavier silty clay soils has always presented some challenges. Plough-based systems can work well but, as well as being expensive, the land can slump during the winter. Minimum tillage works well and strip-tillage was seen as an evolution of that. Several fields were selected and strip-tilled in October 2012 during a dry window of opportunity (for that autumn). Sly Agri, who sell a range of strip cultivators, came and strip-tilled well over 40 ha. The strips weathered down well during the winter and, in the following April (this was a season when drilling was delayed by very cold weather), the sugar beet was drilled using a precision drill with disc coulters. The farm monitored the crop closely and noted that emergence was as good as, and possibly more even than other fields which had been ploughed or mintilled. It was also noted that weed beet levels were lower than expected. The whole field was then harvested in September and, for an early lift was very even, yielding 70 t/ha. (Pics. 3 and 4)

of a tine to effectively prepare a tilled strip requiring no further cultivation before drilling. Initial results were inconclusive but, on well-managed stubble on lighter soil, strip-tillage might compare favourably with ploughing.

Particularly advantageous for sugar beet are the straw residues left between the cultivated strips. These help to protect emerging sugar beet plants from the full force of the wind, as well as reducing water run-off after heavy rain. (Pic. 2)

Pic. 2 – Strip-tilling land destined for sugar beet in the autumn of 2012.

Pic. 3 – View of the strip-tilled crop just before harvest, September 2013.

Pic. 4 – Close up showing root size and evidence of straw debris, September 2012.
Haydn - tuned for high value

Haydn offers:

- Lowest bolting
- Very high Adjusted Tonnes
- Very high sugar content
- Excellent establishment

Very high Adjusted Tonnes, the highest sugar content and the lowest bolting of all the leading varieties make Haydn the first choice for your 2014 sugar beet crop.

Haydn’s outstanding agronomic profile is perfectly in tune with growers’ and industry needs for a dependable, high value sugar beet crop.

Contact Richard Powell
r.powell@strube.net  strube-sugarbeet.co.uk
Strube UK Ltd, 9 Constitution Hill, Fakenham, Norfolk NR21 9EF
My sugar beet seed box ... what do the words and labels mean?

From its King’s Lynn base, Germains Seed Technology processes and treats sugar beet seed for the UK seed account. Working closely with the NFU and British Sugar, and using the very latest biological tools and techniques to maximise the natural potential of seed in the field with established Xbeet priming and proven seed pelleting technology, growers are used to seeing the benefits and additional value this technology delivers.

But what about the box the seed is delivered in?

20 years ago, the sugar beet seed unit packaging changed from a simple polythene formed bag, to the cardboard box we are familiar with today.

Aside from the innovative tear and pull mechanism introduced over a decade ago, an increasing number of labels and text have appeared on the unit pack box since then as a result of legislative requirements.

As a rule, labels are used to communicate the seed variety or treatment information, which are specific to the seed in that box. The text printed on the box itself, rather than a label, represents standard information for all seed, some of which is statutory.

Labels

The ‘Blue Label’

Each unit box features a rectangular blue label on the upper flap of the box. This label includes the certification number supplied by the breeder.

This label confirms:
1. The seed e.g. ‘Certified Seed’ of Sugar Beet (Beta vulgaris)
2. The seed is monogerm and pelleted
3. The name of the variety
4. The unique number of the variety bulk
5. The country where the seed was certified, and the local authority which granted certification e.g. Country of Certification France (S.O.C – Service Officiel de Contrôle et de Certification)
6. The certification number granted by the local authority
7. The packing no. 2301 which is the unique reference for Germains as the packer and Germains’ address
8. The list of treatments applied to the seed (see example on the label)
9. The contents of the box e.g. 100,000 pelleted seed, + or – an agreed tolerance of 3% seeds
10. The packing serial number of the box as it is processed through Germains’ factory to ensure each box is traceable.

In the example of the blue label below the number ‘555-2’ relates to Germains and ‘00001’ is the serial number of the box.

The blue label is a statutory requirement for the sale and marketing of the seed. It is an important and unique identifier for the seed and the unit pack, and should be kept as a reference by the grower as a record and to assist with any future enquiries that may arise.

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By Emmanuelle Noirtin, Key Account Manager, Germains
The breeder’s variety label
Each breeder supplies variety labels, which are applied by Germains to the front and back of the unit pack. This label features variety branding etc.

Treatment label
Each pack also has a treatment label on the side of the box that indicates the treatment product names and a list of active ingredients used on the seed in that box.

Xbeet®/Xbeet® plus
All UK seed supplied in 2014 is Xbeet® primed and pelleted with the EB plus pellet or the standard EB pellet, as indicated on the label on the reverse side of the box.

Pre-printed text information
All boxes, regardless of variety or treatment, are pre-printed with the following information:
- All pellets in the UK conform to the specified pellet grading of between 3.50 mm and 4.75 mm.
- The contents of the box, which is stated as 100,000 seeds, + or – 3%.
- The side of the box is dedicated to safety precautions, many of which are statutory requirements. Other phrases are provided as a code of good safety and responsible practice for the sowing and storing of treated seed, as seeds are biological organisms and susceptible to the influence of the environment around them.

Storing treated seeds
Seeds should always be stored in a cool, dry, well ventilated building. The opened box should be stored in a sealed polythene bag. It is recommended not to store seeds for longer than 18 months and to keep treated seeds secure from people, domestic pets and wildlife at all times during storage and use.

To allow the safe overwintering of seeds, keep them away from volatile vapours, paints, solvents and other chemicals. Do not keep the seeds in a chemical store and protect them against frost, heat and excessive humidity.

SUMMARY
Your sugar beet seed box carries all the information required to ensure that you have full knowledge of the variety, treatments, safety and good practice considerations. It is important to keep the blue label or take note of all the information indicated on this label for reference.
New opportunities and increased uses for sugar were the prevailing themes at the 24th annual consultation of the World Association of Beet and Cane Growers (WABCG) and the International Sugar Organisation (ISO) on 25th November 2013.

About 120 delegates representing 28 countries met at London’s International Coffee Exchange, a record turnout for the event. Delegates heard presentations on ethanol market trends, sugar market overviews and future prospects, and bio-based plastics as a new use of the output from sugar crops.

“The prevailing mood was one of caution and concern,” said Nick Sinner, executive director of the Red River Valley Sugar Beet Growers Association (RRVSGA). “It’s a tough situation because there is a worldwide surplus for the fourth year in a row. People are looking for more ways to use sugar so that they can avoid forfeiting it and having less sugar on the market. Everyone wants to be more productive and find more export markets.”

Guilherme Nastari, director of DATAGRO, spoke about Brazil’s recent diversification developments in bioplastics, 2G ethanol and biodigestion. While Brazil’s ethanol production is increasing, the nation’s sugar production remains the same. Sugar cane prices there are falling while production costs continue to rise. The number of mills has been shrinking since 2009, according to Dr. Leonardo Bichara Rocha, a senior economist at the ISO. Rocha said that little expansion in Brazil’s cane output for 2014-2015 and 2015-2016 is foreseen due to escalating cane production costs, falling world prices and the tightening of labour and environmental regulations.

While there are factories for bio-ethanol production located in Hokkaido and Okinawa, sugar crops are not used for ethanol in Japan, according to Hidehiko Kubota, director of the Sugar Beet Production Division at the Hokuren Federation of Agricultural Cooperatives located in Sapporo.

“Overall, sugar beet acreage and production yields have been decreasing, so the entire crop is used for traditional sugar products,” Kubota said. “Japanese bio-ethanol production has not yet gained momentum; the Japanese people still see sugar beet as food, and bio-ethanol resources are still unprofitable for farmers in Japan.”
Rocha also remarked that domestic sugar prices are relatively flat in importers like the EU, Russia and China, which prevents a bigger response to falling world prices. However, investment in refining capacity in Asia continues to meet booming growth demand, and Malaysia and Indonesia are increasing their refining capacity. Rocha’s presentation also included comments on the impact of climate change on beet and cane. Climate change is adversely affecting sugar cane and causing greater variability in yields. Rocha predicted potential increases in precipitation in high-latitude areas, decreases in subtropical regions, and more intense tropical cyclones in the future. He said that more precipitation in high latitudes combined with higher temperatures has probably led to a twenty percent increase in sugar beet yields across western Europe.

Sugar market overviews and future prospects were also heavily discussed at the consultation. In 2012-2013, production was much higher than consumption. Rocha holds out hope that this situation will correct itself and that there will be less sugar surplus in the 2013-2014 growing year. When 2014-2015 arrives, there’s a good chance that production will equal consumption.

“Consumption and population are going up,” said Nick Sinner. “We need 100 million tons (US) of sugar by 2030. The overall feeling was that consumption will solve growers’ issues if we can survive to that point.”

A world sugar recovery price is likely, though perhaps not in 2014, according to Jack Roney, Director of Economics and Policy Analysis at the American Sugar Alliance. “Meanwhile, growers in the United States and the world will need to continue efficiencies in any way they can,” Roney said. “Research on seed varieties and field and factory practices remain critical to reducing costs.” In London, Roney presented an overview of the U.S. sugar policy and market. He said that the top priorities for American sugar growers are encouraging the U.S. Congress to complete the 2014 Farm Bill in the near future, and urging the U.S. administration to convince Mexico to adopt some type of market stabilisation programme.

“An integrated market must have an integrated policy,” Roney said. “The collapse of U.S. prices is entirely due to Mexico unloading its massive sugar surplus onto the U.S. sugar market. If there is no integrated policy and the U.S. loses its sugar programme, then both the U.S. and Mexican sugar markets will be fully exposed to the vagaries of the world dump market.” The Mexican government is the biggest producer and exporter of sugar in Mexico and owns and operates one fifth of that country’s sugar mills. The U.S.-Mexico sugar market was integrated under the North American Free Trade Agreement (NAFTA) in 2008, giving Mexico unlimited duty-free access. The Mexican sugar industry has shown no discipline since then, according to Roney.

“American growers avoid overproduction by government-imposed marketing allotments. Mexican producers, meanwhile, face no limits and have expanded recklessly,” said Roney. “When Mexico adopts some measures to prevent further overproduction, the U.S. and Mexican markets can regain stability and benefit from some price recovery.”

While American growers strive for integrated policy with Mexico, European sugar growers are preparing for the end of the European Union sugar regime in 2017. Elisabeth Lacoste, General Secretary of the International Confederation of European Beet Growers (CIBE), discussed the outlook for EU sugar after 2015. Lacoste represents 150,000 sugar beet growers from 19 EU countries, as well as beet growers from Switzerland and Turkey.

There are only three sugar beet campaigns left under the current quota system, and key decisions and strategies must be made before the deregulation of the European sugar market. A new inter-professional agreement between sugar beet growers and processors must be negotiated before the autumn of 2016, according to Lacoste. “Fundamental elements of the contracts will still be collectively negotiated, but without previous safeguards and benchmarks for growers. Both parties will have to agree on the new basis of the contracts, and the determination and bargaining of growers will be critical to their success,” she said. Lacoste also stated that there has been a constant gain in the EU sugar yield, and that EU growers must continue this trend.

“The challenge for EU beet growers...is to stay competitive,” she said. “All EU countries must make operations more efficient and trade on the world market. The EU growers must be more productive and find more markets to export to, as well as finding more sources for preferential imports.”

French sugar beet growers are also extremely concerned about the end of sugar quotas in 2017, according to Alain Jeanroy, the Executive Director of the French Beet Growers Confederation. “Our
significant investment in an innovative research program called in particular on beet genetics – we are already making of 2017. “Over the next three years, we hope to make progress beet growers is to enhance their competitiveness by the horizon believes that the main challenge currently facing French sugar of us to do this, but we can never resist a challenge!” Jeanroy our price competitiveness. We have less than three years ahead onto the market. To do this to best advantage, we must work on our price competitiveness. We have less than three years ahead of us to do this, but we can never resist a challenge!” Jeanroy believes that the main challenge currently facing French sugar beet growers is to enhance their competitiveness by the horizon of 2017. “Over the next three years, we hope to make progress in particular on beet genetics – we are already making significant investment in an innovative research program called AKER,” he said. “We intend to do this without going against the majority public opinion on our territory since we have deliberately chosen to exclude any process involving GMOs. Competitiveness, respecting society and the environment – these are the three axes on which we will be concentrating our efforts for the challenge of 2017.”

Continuing to be competitive producers is also a top priority for British farmers, said William Martin, Chairman of the National Farmers Union Sugar Board. “We need to continue to make progress in farm productivity to compete with our French neighbours,” he said. “And if we are to invest to do that, we need confidence in the future of our industry. We are still looking for signs that British Sugar and British growers can work well together to ensure a prosperous future for all parties in the sugar supply chain.” Martin stated that maintaining their traditional collective negotiating strength in the face of a single buyer is a major concern for British sugar beet growers.

“It is good news that the EU has acknowledged our situation and has agreed to allow us continued freedom to act collectively,” he said.

“There was an interesting discussion about how many sugar farmers worldwide are ‘prisoners of the crop,’” said Martin. This term refers to growers for whom reducing or stopping production of beet or cane in response to market prices is difficult, or even nearly impossible, according to Martin.

“Reasons for this vary from cane growers whose land is suitable for little else, or in regions where a large indigenous population relies on sugar cane for employment and economic survival; to beet growers whose membership of a co-operative processor means they are committed to fixed costs whether or not they grow the beet,” he said.

Delegates agreed that it is perhaps only some Indian cane farmers, and some European beet growers who are not members of cooperatives who have real flexibility from year to year in production decisions.

“This means that global supply is slow to respond to market price signals, which leads on to the likelihood of continuing wide swings in prices in future, even if around a more remunerative average,” said Martin. “Therefore growers need to continue to explore ways of protecting themselves against price volatility, which has not traditionally been easy, or even necessary.”

In Japan, Hidehiko Kubota said that the Japanese sugar industry has been closely following their government’s progress on negotiations with the United States. “Sugar is not a free-trade item in Japan,” said Kubota. “Foreign raw sugar is a tariff-free import of raw materials, but other sugar products are subject to custom duties. However, the Japanese government has been working toward a negotiated agreement of the Trans-Pacific Strategic Economic Partnership with the United States and other neighbouring countries, so future tariffs could be eliminated.”

The sugar beet industry in Japan is driven by geography. Kubota said that sugar beets are grown in Hokkaido, the northermost region of Japan, while sugar cane is grown on the southern Japanese island of Kyusyu, 1,600 miles away. While the distance makes it difficult for beet and cane growers to work together, all Japanese sugar growers closely watch the world sugar market. Thailand is of particular concern to the Japanese sugar industry. “The amount of sugar Japan imports from Thailand is very large. Japan imports raw sugar from Thailand and it is used by Japanese white sugar production companies as a source for sugar,” said Kubota. “Most of the sugar in Japan is made from foreign raw sugar, so Thailand’s market trends directly affect Japanese sugar prices.”

In addition to attending the WABCG/ISO consultation, Nick Sinner and David Thompson of the RRVSGBGA had the opportunity to tour British Sugar’s Wissington Factory in Norfolk. “It’s a very automated system,” Sinner said. “There is also a representative from the Farmers Union present in the tarehouse and beet intake.”

“It was great to tour the factory because it’s important for all of us to take opportunities to see the world beyond our four walls,” Sinner said. “The sugar market is becoming a worldwide market even for us in the United States.”

Although the next few years will be filled with uncertainty, it will also be a time of new opportunities, as Elisabeth Lacoste said in London.

Growers worldwide will continue striving to increase efficiency and yields, and remain competitive, but they will also face new challenges of managing their production in new contexts.

“We all need to learn from each other as we look for new markets and opportunities,” Sinner said. “Growers must maintain relationships with each other and learn about what others are preparing for and how they will deal with a worldwide market.”
Celebrate British Farming & Food at Open Farm Sunday 2014

Open Farm Sunday is now in its ninth season and the date for your diary this year is Sunday 8th June 2014. LEAF (Linking Environment and Farming) the organisers of this annual event invite everyone to ‘Celebrate British Farming & Food’ at one of the many host farms throughout the country. Now a major event in the farming calendar, Open Farm Sunday is supported by many local sugar beet growers who welcome the public onto their farms to experience and learn about food supply and the link between agriculture and the food retailers. Attendance records were smashed in 2013; the eighth year of the event with 200,000 visitors going through the gates of the host farms.

Local sugar beet grower Mr. Michael Sly of M.H.S Farms Ltd, Park Farm, Thorney hosted his first Open Farm Sunday event in 2006 welcoming 12 visitors. Since then the popularity of this location has increased massively to a staggering 7,000 visitors (over 2 days) in 2013.

At Park Farm Thorney last year there were farm machinery exhibits from bygone years to current day, which clearly showed how agriculture has embraced technology over the years. One of the key aims of Open Farm Sunday events is to allow the public to understand how important sustainable
food production is, and also how UK agriculture plays a key role in caring for the countryside.

There really is something for everyone at these events, including tasting Cornerways tomatoes or baking and sampling fresh bread made from KWS wheat varieties grown on local farms. You can try all sorts of food and drink from delicious burgers and sausages, sourced from locally reared meat, to English beers and wines, sampling cheeses, pies, honey, relishes. There is even a chance to pick your own vegetables.

The event is a wonderful platform for learning about farming over the years, the different types of livestock on the farm, the different crops which are grown to produce our food and the link between farming and the countryside.

The British Sugar stands at these events are designed to be interactive and our exhibits last year had various displays including: information on the sugar beet produced by local farmers, how it is grown and harvested, and a beet’s journey from field to factory, the factory process, and a selection of samples from the Silver Spoon product range.

Initially many visitors picked up a sugar beet and a tomato not having any idea of the connection between the two. However, once they had completed our quiz they understood the link. Each correct entry was rewarded with a bag of Cornerways tomatoes. This interactive quiz clearly demonstrated that British Sugar – is Not Just Sugar!

Being part of the event is very rewarding and, as a member of staff manning the stand, I thoroughly enjoyed my day at Park Farm last year. It was really encouraging to see the number of visitors who came along to find out how beet sugar is grown and processed, and to raise awareness about where our food comes from and how farmers produce it.

Members of the agricultural teams at the four British Sugar sites will once again be supporting various sugar beet growers throughout the factory areas who are hosting Open Farm Sunday events this year. We would like to thank those growers for their invitations past and present, which enable us to demonstrate that British Sugar and Silver Spoon are truly home grown food.

For further information please contact www.farmsunday.org
BBRO news

New BBRO Sugar Beet Reference Book 2014

All sugar beet growers, agronomists and consultants should have now received a copy of the BBRO’s ‘new look’ Sugar Beet Reference Book for 2014. The new format has been designed to provide all the necessary information needed to assist decision making on the farm to maximise sugar beet yield and financial return.

The book includes supporting financial information and comparisons with benchmark information from the Crop Survey and contract data. The new design also includes convenient tabs to enable easy access to the relevant sections.

The BBRO’s Pest, Weed and Disease charts that in the past were issued as separate documents are now included within the Reference Book.

The new Sugar Beet Reference Book is in direct response to growers’ feedback and is one of several new BBRO initiatives and includes the following key topics:

- Drilling Date
- Plant Populations
- Crop Nutrition
- Weed Control
- Weed Beet
- Fungicide Strategy
- Harvest and Storage
- Variety Selection
- Seed Treatments and Pest Control
- Beet Cyst Nematode
- Soil Management
- BBRO Trials Programme
- Pest, Weed and Disease Charts

If you have any comments or suggestions please contact the BBRO on 0330 3355533 or email info@bbro.co.uk

BBRO joins Twitter!

If you were at the BBRO Winter Conference held at the Peterborough Arena on Tuesday 4th February, you may have heard that the BBRO is now on Twitter. We will be providing details of future events, crop updates along with technical and industry information at @BBRO_Beet.
LAMMA 2014 awards review: multi award winning Garford Robocrop Spot Sprayer

Garford Farm Machinery Ltd, the Deeping based farm machinery manufacturer, enjoyed a good couple of days at the recent LAMMA 2014 show, walking away with two major awards for their Robocrop Spot Sprayer.

The Robocrop Spot Sprayer was awarded both the Maurice High Trophy for Best New Product or Innovation at Lamma 14 and the IAgrI Ivel Award for the Best New Product or Innovation – Environmental. The awards come five years after winning the same awards for the Robocrop InRow Weeder. Philip Garford, Managing Director, commented “being a LAMMA exhibitor since almost the start of the show, LAMMA Awards are always that bit more special to us at Garfords and we are thrilled to receive both awards”.

The Spot Sprayer is the latest in the Garford Robocrop Family utilising the Robocrop imaging system which in the case of the spot sprayer firstly defines the position of the crop and then looks for clumps of weeds growing between or amongst the row which it then targets with a special jet of weedkiller in order to kill the weed but avoid contact with the crop. In this way problem weeds can be controlled with extremely low rates compared to overall spraying, often only 1 or 2% of the overall rate.

The Robocrop Spot Sprayer has been in development over the last few years by Garfords technology partners, Tillett Hague Technology, prompted by the impending withdrawal of key herbicides, particularly those used for volunteer potato control in onion and carrot crops.

The technique could be employed in other crops where a regular crop row structure can be identified and clumps of problem weeds exist.

As well as development of the image analysis software, the project also involved the design and development of a special fluidic nozzle, in conjunction with Hypro EU Ltd, to provide an accurately directed jet of spray composed of a very narrow range droplet size in order to avoid splash off or drift.

The Spot Sprayer is currently available in sizes up to 6 mtr working width and working speeds of 7 kph are normal.
**news**

**Centurion MAX adds significantly to black-grass control programmes in sugar beet**

Sugar beet is very sensitive to weed competition early on, and a planned approach to weed removal is the best and the most common approach. More recently black-grass has become more of an issue in sugar beet, generally due to the difficulties of effective control in other parts of the arable crop rotation. Growers who are struggling to control this particular damaging weed on their farm should integrate the new graminicide Centurion MAX (clethodim) into their weed control programme this spring and so reduce weed competition in sugar beet and minimise seed weed return in following crops.

“Centurion MAX was introduced to the UK market last autumn in winter oilseed rape and many growers and agronomists have been impressed with the results they have seen on farm. Many have noted the superior performance of clethodim on black-grass, even strains that have been more difficult to control in the past. We are expecting that growers who use this graminicide in sugar beet this spring will be equally delighted,” says Stewart Woodhead, Technical Manager for Interfarm UK.

“Centurion MAX controls black-grass, annual meadow-grass, wheat and barley volunteers in sugar beet. One of its special attributes is that, although it is an ACCase inhibitor product, it is active on strains of black-grass that are resistant to other ACCase products. It has been shown to outperform all graminicides, even tepraloxylid that, until clethodim’s launch, was considered one of the best grass-weed herbicides and was the leading graminicide in sugar beet. Centurion MAX could now take the top position in terms of performance. But despite its activity, it is important that it is used wisely in an integrated way,” says Stewart.

“This integrated approach in sugar beet should involve both cultural and chemical control. Winter ploughing and of glyphosate can be implemented before drilling beet. When it comes to herbicides, growers should aim to use products with different modes of action such as ethofumesate and clethodim. Just as in cereals, stacking pre-emergence herbicides should be planned and then post-emergence herbicides including the best graminicide, which in my view is clethodim’s launch, was considered one of the best grass-weed herbicides and was the leading graminicide in sugar beet. Centurion MAX controls black-grass, annual meadow-grass, wheat and barley volunteers in sugar beet. One of its special attributes is that, although it is an ACCase inhibitor product, it is active on strains of black-grass that are resistant to other ACCase products. It has been shown to outperform all graminicides, even tepraloxylid that, until clethodim’s launch, was considered one of the best grass-weed herbicides and was the leading graminicide in sugar beet. Centurion MAX could now take the top position in terms of performance. But despite its activity, it is important that it is used wisely in an integrated way,” says Stewart.

“Centurion MAX contains 120 g/l clethodim and is formulated as an emulsifiable concentrate with its own in-built adjuvant and packed in a 5 L container. It is recommended for use post-emergence in sugar beet and winter oilseed rape to control black-grass, annual meadow-grass and cereal volunteers. It is applied at a dose rate of 1 litre/ha in 200-400 litres of water as a fine or medium spray quality. In sugar beet it can be applied from cotyledon stage up to before row closure and 56 days before harvest. One application can be applied per crop. Centurion MAX has no LERAP.”

Stewart advises that Centurion MAX can be applied at a dose rate of 1 l/ha from when the sugar beet has fully expanded cotyledons or first leaves visible up until before row closure. It will control black-grass and cereal volunteers from the 3 leaf stage to 5 tillers, with annual meadow-grass from 3 leaves to tillering. “In practical terms it is the black-grass stage which governs application timing, with 3 leaves being the best timing.”

He advises that the dose rate of 1 l/ha should not be reduced. “This is the effective dose rate and one that delivers the high level of weed control we would expect. In trials Centurion MAX gave 98% control of black-grass and 96% control of annual meadow-grass, a weed that few other ACCase graminicides can control.”

In UK and EU trials Centurion MAX gave good activity on rough-meadow-grass, wild-oats, ryegrass species, brome species, canary grass and fescue. In trials in sugar beet to control wild-oats, clethodim gave 90% control, tepraloxylid gave 80% and cycloxydim and propaquizafop 85% control. “Removing weed competition early and effectively will help the sugar beet grower achieve his ultimate aim of high yields,” he says.

Centurion MAX should not be applied in situations where the target weeds are under stress e.g. waterlogging, frost, natural dieback, drought or other environmental conditions that could interfere with its activity.

**Knight announces high-performance cab option**

Knight Farm Machinery used the 2014 LAMMA Show to announce that Category 4 cabs, giving drivers the highest standard of protection against hazardous substances, would be available on its self-propelled sprayers. Knight is the only UK sprayer manufacturer offering this option.

The standard of protection against hazardous substances provided to drivers of tractors and self-propelled sprayers is classified within European Standard EN 15695. Category 1 provides no protection, category 2 protects against dust, category 3 protects against dust and aerosols, and category 4 prevents vapours, dust and aerosols entering the cab.

The category 4 cabs being offered by Knight have multi-stage filtration and are pressurised to ensure there is no access for air and contaminants other than through the filters. In other respects cab design is not changed, and comfort and convenience remain excellent.

LAMMA also gave farmers and contractors the first opportunity of the year to take a close look at Knight’s expanded range of cultivators, including Bednar machines from the Czech Republic for which the company is the sole UK importer. A Swifterdisc multi-purpose cultivator, available up to 14 metres wide, and a Fenix FO with working widths from 4 to 7 metres were both on display.
British Sugar attends the Norfolk Farming Conference

A £100m investment programme in British Sugar’s factories across eastern England over the next three years was announced at the Norfolk Farming Conference yesterday.

Colm McKay, director of agriculture, told about 250 delegates at the John Innes Conference Centre, of plans to invest an initial £50m plus further investment to prepare for the ending of Europe’s sugar quotas from 2017. “We need to have the confidence that we can cope with seasons when the beet quality is not ideal; with this in mind, we are investing close to £50m this season and anticipate similar investment levels in the coming three years,” he added.

The investments included an energy reduction project, control system replacement, and thick juice import and export capability at Cantley. Last December, a total of 270 tonnes of energy-saving equipment was transported by barge from Lille in northern France as part of the estimated £12m investment.

Mr. McKay said that the Wissington factory, near Downham Market, which is the world’s largest beet processing refinery, will also benefit from the investment in a refurbished diffuser and increased filtration capacity. The projects at Bury St. Edmunds, which was the second largest factory, include increased juice tank capacity while a new animal feed drier will be installed at Newark, Nottinghamshire. “This shows that we are serious about increasing factory input and our reliability,” he added.

British Sugar had invested significantly over the years with about £300m invested since 2005, said Mr. McKay. It was worth remembering that the home-grown industry produced a record 1.3 m tonnes of sugar in 2011. He told delegates that the sugar industry had boosted crop productivity by more than 60 per cent since 1980 and that British Sugar’s factories had cut energy use by 25 per cent in the past quarter of a century. Mr. McKay said that British Sugar’s cost of production is competitive with other beet producers and increasingly with top cane producers around the world.

However, he warned that the ending of Europe’s sugar quotas from 1st October, 2017 was likely to see a further slide in prices. A combination of more competition from European producers and a further slide in the world ‘raws’ price, which had already fallen from 36 cents per lb to the present 15 cents, or about £220 tonne, were likely to put beet prices under pressure. Mr. McKay told growers that British Sugar wanted to have an appropriate campaign length that maintained beet as an attractive crop to both growers and processor, in order to make efficient use of its assets. Furthermore, the continuing increase in average yields was a welcome trend.

However, Mr. McKay emphasised that the disappearance of sugar quotas from 2017 onwards would bring some serious challenges for the industry. Colm stressed that in order to remain competitive in a future deregulated EU marketplace, both UK growers and British Sugar would have to work even closer together in partnership to ensure that sugar beet remained a profitable crop for both grower and processor. “Despite the forthcoming challenges, the UK beet industry has a distinguished track record of productivity and success which is the envy of many other sectors of the farming industry” Mr. McKay maintained.

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New measurement techniques aid quality improvements for sugar beet seed

One of the challenges in researching improvements in sugar beet seed is getting accurate and consistent measurements without destroying growing crops.

A portable 3D plant laser scanner has been developed by Strube as a part of an armoury of tools to measure key parameters in the growth of beet. The scanner allows the recording of emergence characteristics, plant numbers, plant quality and plant homogeneity to give an objective evaluation of the quality of crops in the field without interfering with the plants.

The scanner can be positioned anywhere in a field to record plant parameters, which can then be correlated with measured seed characteristics and seed treatments.

Strube has been instrumental in developing new cutting-edge techniques for the analysis of seeds and plants under Dr. Antje Wolff, Head of Seed Research. "Something can only be optimised if it can be measured;" she says "the more we know about our product, the easier it is to make improvements."

The scanner is the latest in a series of technologies used by Strube in non-destructive testing. Recent upgrades to X-ray tomography now allow automated measurement of 26 parameters of 100 individual seeds at a time.

The importance of these new techniques is underlined by Strube UK Managing Director, Richard Powell: "To make sure that genetic improvements are realised in every grower's field, we continue to invest in the techniques that make sure that we can produce high quality seed in volume."

New sugar beet weed guide is free to download

BBRO 2014 Winter Conference sponsor Makhteshim-Agan (MAUK), maker of market-leading sugar beet herbicide Goltix, has launched its new interactive sugar beet weed guide.

Seen as particularly useful for growers and agronomists intent on contributing to the drive to increase yields by removing costly weed burdens, it downloads onto most mobile phones, tablets, laptops and PCs.

Britain’s leading branded off-patent crop solutions manufacturer asked its GB technical team to develop the guide as an aid for busy growers and their advisers to use in the field or farm office as 2014 crops become established. They came up with not just a simple-to-download and use planning tool for the office but a gadget for field-walking agronomists and their clients, bringing the prospect of immediate spray decision making to the field.

Lisa Hulshof, BASIS-registered marketing manager for MAUK, said she was delighted with the new guide and that pre-launch tests had resulted in considerable enthusiasm amongst agronomists.

"In particular they liked the mobility of the guide – once downloaded it stays on your smartphone or tablet and can be used in the field without recourse to the internet. It was also praised for its linkage of particular weeds and weed spectrums to the herbicides best known for their efficacy in sugar beet crops, such as metamitron (Goltix), the key residual active ingredient for sugar beet, she concludes.

The new MAUK sugar beet weed control guide can be found at: www.mauk.co.uk/sugarbeet. It's completely free to download.
BURY ST. EDMUNDS FACTORY

2013/14 crop and campaign
The factory finished processing on the 23rd February at 4.00pm, with the last beet having been delivered on Saturday 22nd February, 150 loads being delivered on the last day. Bury was the first factory to finish processing this year; the crop yield has been quite exceptional despite the very cold spring. Bury has sliced more beet this campaign than it ever has done before, 2.2 million tonnes. The factory has also achieved a record campaign average daily slice throughput of over 14,000 tonnes/day. This is despite slowing down for the last few weeks due to beet supply and the need to manage sugar storage.

When the factory closed there was still around 20,000 tonnes of beet of the Bury crop remaining un-harvested due to the very wet winter weather. This tonnage was lifted and delivered to Cantley and Wissington before these factories closed, which helped give growers more time to lift in better conditions and utilise backload opportunities for LimeX70 and Pressed Pulp.

Once the last beet is pushed into the factory it takes a couple of days for the last of the juice to be processed and for the factory to cool down. The animal feed driers this year have also continued to produce feed product for a further two days due to a failure on the driers just before slicing finished. Mechanically the factory has had a very reliable campaign, the only two difficulties this year have been due to two problems with the main boiler house and both were resolved quickly.

Sugar content this campaign has been very difficult to predict again. Being a lower sugar content year, it is normal for the profile to be flat throughout the campaign, this year the sugar content increased at the start of the campaign, but soon levelled off to around 17.3%. There was some disappointment around the sugar content and yields at the start of the season. Sugar content never dropped below 17% all campaign, and in the last few weeks increased from around 17.0% up to 17.8% in the final week, giving us a lot more sugar to process at campaign end. It was felt this late season increase was mainly due to very low roadside stocks post-Christmas and with fresh-lifted beet experiencing no frost, the crop remained green and kept growing. (Fig. 1).

Crop yields increased as the campaign progressed. In the first month, field yields of around 40 t/ha were not uncommon, but by the end of the campaign yields well in excess of double this were commonplace. The high levels of late season growth this year have been great news for growers in terms of crop returns, and the volume of sugar the sites have needed to handle increased dramatically, once it was realised around Christmas the large size of this year’s crop; the 2013/14 yield will be the second largest ever for Bury.

Campaign – 2013/14 crop performance for Bury factory

<table>
<thead>
<tr>
<th>Clean yield</th>
<th>91 t/ha</th>
<th>Contract performance</th>
<th>106%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjusted yield</td>
<td>69 t/ha</td>
<td>Dirt tare</td>
<td>6.2%</td>
</tr>
<tr>
<td>Sugar %</td>
<td>17.3%</td>
<td>Amino N</td>
<td>61</td>
</tr>
</tbody>
</table>

Factory projects
This coming off-season will see a major construction project taking place to completely replace and increase the filtration capacity of the factory. A new gassing tank is also being installed to improve the carbonation process along with a new raw juice tank which takes the juice from the diffusers. These are actually three major projects rolled into one new development area of the factory site (Pic. 1).

The civil work and foundations have already been constructed in campaign to ensure the new plant items are ready for next campaign. This is a significant investment for the factory and will increase the reliability of this part of the process (Pic. 2). The location of this new plant is where the beet pumps used to be many years ago before the current flat pad was constructed. This new plant will replace the GP filters which were problematic in the 2012/13 campaign.

BBRO Open Day
The Bury factory BBRO open day will be held on Thursday 22nd May. More details will be available through the BBRO. The day includes discussions on the latest agronomy techniques for maximising crop yield and working towards the BBRO 4x4 initiative.

Wishing you a successful season for 2014-15.

Dan Downs
Agricultural Business Manager

Fig. 1 – Sugar content – Bury.

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CANTLEY FACTORY

2013 Crop

With just two weeks of the campaign left, and following a difficult spring and changeable summer, the crop has responded remarkably well to the mild winter and is set to deliver a very respectable result. On average, growers have achieved over 103% of contract at a yield of 68 t/ha (adjusted). The yield has come from increasing sugar content, coupled with substantial improvement in root weight during the first few months of campaign. Once again a second fungicide application has kept the crop green and able to capitalise on the mild weather.

Sugar content through the campaign.

Unfortunately the north eastern part of the Cantley area suffered the worst from low summer rainfall and prevented it yielding well above the average as it would normally do.

After a slow start, Cantley factory has had no significant mechanical or process issues to hamper progress; a pleasing result against ever-increasing attention to maintenance planning and capital investment in the factory. General factory maintenance is a year-round process, but on completion of the campaign everything steps up a gear. Detailed plans are in place to ensure all resources and time are fully utilised so work can be completed efficiently and to high standards. Throughout the campaign the factory team have been working on our capital projects which will deliver additional evaporators, a pre-scalder and the full juice import/export facility for next campaign. The work to date has already changed the Cantley factory skyline for those passing along the river.

New evaporators being lifted in place having crossed the channel by barge.

For those unable to practise just-in-time delivery for all beet, the Cantley team have been testing some remote temperature sensing devices, which use a mobile signal to send a text message of the in-clamp temperature to a pre-programmed number. Using previous detailed BBRO work, this temperature can be related to ambient and used to provide an early warning of over-heating. A £200 investment could provide a cost-effective means of managing the risk to beet in clamp. I would expect the units to last three or more years, so if you are interested in how we get on with these please talk to your area manager.

Our order book for LimeX45 is already ahead of previous years, so I would recommend ordering early to ensure you can secure your needs. We will be starting despatch in early May this year.

Our Landscape 20 Topsoil meets the standards for general landscaping and has become a very popular product with landscapers and developers. It is available throughout the year from our covered store and is very competitively priced. We also supply boiler ash and stone material for use for track maintenance, horse ménages, etc. at very attractive prices.

Finally I would like to wish you all the very best for the 2014 crop and remind you that the Cantley BBRO Open Day will be Thursday 15th May, details will be confirmed nearer the time, but we look forward to seeing you there.

John Emerson
Agricultural Business Manager
Dry and sunny weather in the third week of February, together with sugar beet seed for the 2014 crop out on farm, is resulting in a number of growers already starting to turn their thoughts to drilling. Expectations are rising for warmer and drier conditions in March to enable a good start for the new crop.

**Factory**

The current campaign continues to progress well, with completion anticipated in the second week of March. Factory performance in general has been good, aided particularly by the two new falling-film evaporators, with throughput now at an all-time high.

Once we shut down the factory, and before our juice run commences, we will be replacing our three Broadbent centrifuges with the latest BMA machines to improve our daily crystal production still further. The new centrifuges arrive on site on 3rd March and this new investment project at the factory will cost around £1.7m. In addition we are also investing in a new animal feeds drying drum, to further improve reliability in this area, given the higher slice rates now being achieved.

Our maintenance reliability planning programme – an IT based system – continues to be used to full advantage to ensure increased reliability of all our plant and ensure that our maintenance resource during the off-season is focused in the right areas.

**Crop**

500 out of our 800 growers, who grow 40% of our total crop, have now finished deliveries for this campaign and will have produced the second highest clean yield ever at Newark. The consistency of sugar content in deliveries has been remarkable this season, currently running at 18.1% – the same as they were in the fifth week of the campaign. The absence of frost, together with good beet storage conditions and the fact that a very high proportion of beet is now delivered harvested, has probably helped maintain sugars.

Overall, finished yields at Newark are surprising a lot of people, particularly given the cold start and delayed drilling last March/April; once again it proves the remarkable resilience and yield potential of the sugar beet crop under varying weather conditions.

**Co-products**

LimeX sales and despatches are 60% up on this time last year and availability is still good for spring and summer, and we recommend you do not delay placing orders, especially as the additional fertiliser elements available in the product make it very attractive to customers in these cost conscious times.

Demand for Topsoil is also high and we are currently supplementing our available supplies from Wissington Factory to fulfil despatches. Our ponds are again full of soil and as soon as the campaign ends we will begin the process of excavation, to ensure we have storage capacity for next campaign. We ask that growers continue to use cleaner loaders at all times, as we have had to reject a number of loads for excessive loose soil this season that could easily and practically been avoided if a cleaner had been used in the first instance.

**My last news!**

Having now completed 23 years as Agricultural Business Manager at Bardney, York and Newark factories, and 37 years in the industry overall, I have decided to retire early at the end of this campaign and this will be my last factory news piece. I am looking forward to a change and to taking a break from sugar beet! I would just like to wish everyone in the UK sugar industry future success, and in particular to my successor – Nick Morris. I sincerely hope he enjoys the role as much as I have. Adieu.

David Dunning
Agricultural Business Manager
The 2013/14 campaign at Wissington Factory started on Tuesday 17th September and, at the time of writing, will be completed during week commencing 10th March 2014. The factory daily slice peaked at 19,536 tonnes in October 2013. Having had a wet January and early February the weather in late February finally took a turn for the better which enabled the remainder of the crop to be lifted and delivered to the factory in good condition.

Sugar content this campaign has stayed fairly static after an initial peak in mid-October (17.84%). The slight drop after mid-October was due to the increased levels of rainfall and subsequent crop growth. Crop yields have varied dramatically across the factory areas this season. To the East and North of the factory, yields have been close to the five-year average but to the West and South of the factory, on the silts and fen, yields have far exceeded all expectations, given that the average drilling date of the crop was one of the latest in recent years. The very mild autumn has meant that the crop has seen some excellent late season growth. Lifting and storage conditions have also been favourable; as a result the 2013/14 crop will be Wissington’s third highest yield on record.

Once the campaign is over, the factory starts its off-season maintenance programme which will include: two evaporator stainless steel refits, a new cooling tower, continuation of the refit of diffusers stainless steel and diffuser circulation pipework. This work will be in addition to the standard factory maintenance programme.

Please make sure you have made arrangements for soil tests for next year’s crops. Wissington offer a full pH, nutrient, BCN and Free Living Nematode testing service. Please contact your area manager to book your fields in and also to order LimeX70. In previous years we have sold out of product in the summer so please take action now to secure your requirements. With nutrient prices ever-increasing, seek advice from your area manager about the nutrient content of LimeX70.

Preparation for the Wissington BBRO Open Day at Abbey Farm, West Dereham on 13th May is well under way. The event will be hosted by Mr. P. Shropshire. The Agricultural Team and I hope you will be able to attend this event and look forward to meeting many of you on the day. Please make a note in your diary.

Finally, following a successful interview process, Nick Morris will be moving from Wissington to the Newark Agricultural Team in the position of Agricultural Business Manager. Nick has been a valued member of the Wissington Team over the past 5 years since he completed his graduate training. I would like to wish him every success in his new role.

Andrew Dear  
Agriculture Fieldstaff Manager
• Special recommendation for AYPR Rhizomania
• Double rhizo resistance – Rz1 + Rz2
• High yield outside of infestation – 99.2%
• Very high sugar content – 18.73%
• Overcome Rhizomania with Sandra KWS

Data Source: BBRO Sugar Beet Recommended List 2014

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