



The battle to control septoria

While yellow rust has grabbed the headlines in recent years, *Septoria tritici* remains the number one cereal disease. Managing the disease remains a challenge. Growers need to take into account resistance, lack of eradicant activity across all modes of action (MOA), availability of new MOA and how to maintain a protective situation as much as possible given the limited number of spray days generally available. Crop production technical lead, Dr Paul Fogg advises how to make your winter wheat T1 fungicide strategy successful.

Resistance

Genetics have an increasing role to play, with varieties such as LG Sundance (7.3), KWS Siskin (6.8) and Graham (6.3) setting a new benchmark when it comes to septoria resistance. However, this is only part of the solution and it could be argued that their true value comes from the practical benefits they bring in season, for example offering a level of insurance against delayed spray timings.

Timing

Most crops now receive a T0 as standard as this takes some pressure off the T1 spray. However, the timing of the T1 fungicide remains fundamental to success of the overall programme. Nodal growth stages give a good indication, with the target being BBCH 31-32, but the most important consideration is leaf emergence on the main stem, the target being when leaf three is 60-70% emerged. Go too early and much of leaf three will be left unprotected, but too late and the tip of leaf three is likely to become infected, which will increase the threat of infecting leaf two and the flag leaf. It's important not to go too early as this will extend the gap between T1 and T2 which should be four weeks at most; this is why the T0 is important. This is again where varietal differences start to show. In trials in the East of England last year, there was up to 10 days difference (13th - 23rd May) between full flag leaf emergence in the earliest and latest varieties.

Chemistry

When it comes to the fungicide strategy at T1, the simple answer is to use the best chemistry available. Ensure tank mixes are balanced, which is particularly important when it comes to the SDHI and

triazole components, and include a multi-site. It's not difficult to find septoria in most Recommended List varieties in our 3D thinking sites across England and Scotland at the moment. With the benefit of hindsight, it's always possible to hypothesise that a triazole + chlorothalonil would be adequate and this was the case in trials on certain late sown varieties last year. However, if you commit to a reduced input programme at T1, then April and May turn wet and the gap between T1 and T2 starts to get stretched, the reality is that there is more to be lost than there is to be gained.



Septoria in 3D thinking winter wheat trials in Norfolk earlier this month

To ensure effective control, work in a protectant situation as much as you can, make sure that programmes are front loaded and include as much MOA variety as possible, tailor the dose to risk and time treatment to growth stages.

"Timing is critical; too early and much of leaf three will be unprotected, but too late and the tip is likely to become infected."

Dr Paul Fogg

Crop production technical lead



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Fighting broadleaved weeds

Even though weather conditions remain unsettled, soil temperatures are generally on the rise which will encourage further weed growth and germination (Figure 1). Resistance to herbicides is on the increase, but the availability of new chemistry is great news for growers. Crop production technical lead, Dr Paul Fogg, considers the current situation and how a new product, Zypar will help.

To prevent yield loss from typical levels of overwintered broadleaved weeds, the aim should be to treat crops by BBCH 31. Where robust autumn residual herbicide programmes have been followed up with contact graminicides +/- additional residual chemistry, further treatment may not be necessary except for spring germinators and cleavers.

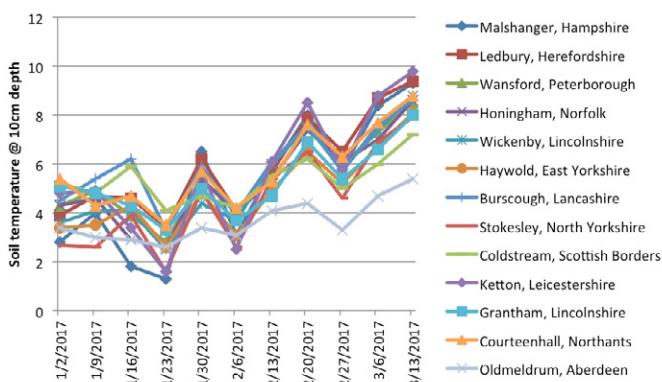


Figure 1: Average weekly soil temperatures at 10cm depth at Frontier 3D thinking sites

Broadleaved weed resistance

While resistant populations of broadleaved weeds in the UK are still relatively uncommon, cases are on the rise. In the most recent survey (Hull et al 2014), acetolactate synthase (ALS) inhibiting herbicide resistance was found in common chickweed on over 50 farms in 13 counties in England, Scotland and Northern Ireland, in common poppy on over 40 farms in nine English counties and scentless mayweed on five farms in Yorkshire, Norfolk and Angus (Figure 2).



“This new chemistry has shown excellent control of key problem weeds and is flexible when it comes to practical use.”

Dr Paul Fogg
Crop production technical lead

Target site resistance to ALS inhibitors remains a concern. Proline 197 is the most widespread mutation and impacts sulfonylurea herbicides, e.g. metsulfuron-methyl, but not triazolopyrimidine herbicides, e.g. florasulam. The Tryprophan 574 mutation conferred resistance to both metsulfuron-methyl and florasulam. For more information see [AHDB Information sheet 54](#).

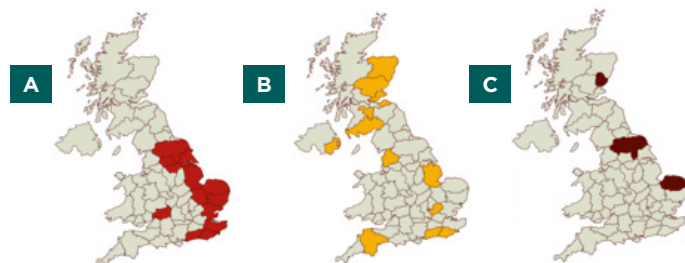


Figure 2: Location in the UK where populations of resistant common poppy (a), common chickweed (b) and scentless mayweed (c) have been identified. Maps sourced from AHDB Information sheet 54 and produced by Rothamsted Research.

When it comes to resistance management there are some simple take home messages: don't rely too heavily on ALS chemistry, use complementary mixtures and mix modes of action where possible.

New chemistry

Dow AgroSciences gained its first approval for Arylex™ (Halauxifen-methyl) in March 2016 in a co-formulation with fluroxypyr. A second authorisation has been granted for a co-formulation with florasulam and will be marketed as Zypar. Zypar contains brand new chemistry (Arylex™) which has a different mode of action to the ALS herbicides, so will bring benefits where resistance is a known issue.

The product has shown excellent control of key problem weeds including cleavers, poppies, cranesbill, fumitory, fat hen, chickweed, brassicas and mayweeds. Zypar can be used on all winter and spring cereals except oats. One of Zypar's key benefits is its flexibility when it comes to practical use, as it can be applied in both autumn and spring, from BBCH 11 through to BBCH 45 and is not constrained by temperature as some products are.

Fortunately, broadleaved weed resistance is currently less of an issue than in grass weeds. However, as with all biological systems this could change. The regulatory landscape could have as much if not more impact on product availability and control options as we move forward. The need for integrated approaches linking existing tools with new chemistry and novel approaches when it comes to sustainable crop production has never been more important.



Black-grass trials findings and future focus

As growers push on in the fight against black-grass, Frontier's dedicated 3D Thinking black-grass site in Nottinghamshire continues to investigate the most effective methods of managing this problem grass weed. Research and technical support manager, Christine Lilly, shares the key messages from the site so far and explains how the trials are being developed to build on the findings.

Located at Staunton in the Vale, Nottinghamshire, trials have now been established at the site for six years. The soil type is heavy clay which is prone to waterlogging in winter. Having always been in an OSR/wheat rotation with cultivations based on non inversion tillage and no ploughing for at least 15 years, the site supported a high population of resistant black-grass when the project started.

A whole range of management techniques and rotations is employed to see how different approaches work together to minimise black-grass seed return. The impact of the different establishment techniques of non inversion tillage, direct drilling and ploughing, in combination with different drilling dates and seed rates, have all been tested. The 0.5ha plots examine other measures including spring cropping and winter wheat following a 12 month fallow. A full herbicide programme is applied to the crop each season.

Findings to date

- Spring cropping has been influential in reducing in-crop black-grass populations, particularly when combined with ploughing at this site.
- Delaying drilling from September to mid October has reduced black-grass but populations are still very high.
- An alternate wheat/fallow rotation has consistently had the lowest level of black-grass.
- In-crop glyphosate use has reduced black-grass in the subsequent crop in a non-inversion situation.
- Cover cropping has tended to delay germination of black-grass into the following spring crop.

The effect of spring cropping can be seen in table 1. Two consecutive years of spring cropping have resulted in less black-grass than one year of spring crops.

To find out more about the site or arrange a visit, please speak to your local Frontier contact.

Technique	Non inversion winter wheat	Non inversion winter OSR	Non inversion winter wheat	Plough spring wheat	Non inversion winter/spring OSR
Year	2012	2013	2014	2015	2016
Black-grass heads/m ² (after 1 year of spring cropping)	500	150	485	3	80 (winter)
Black-grass heads/m ² (after 2 years of spring cropping)	500	150	485	3	10 (spring)

Table 1: The effect of spring cropping on black-grass

This year's trials

Cropping for the 2017 season is a mix of winter wheat and spring barley. Pre and peri-emergence herbicides have been very effective and black-grass populations are currently low in all winter cropped plots. Interestingly, only a low population of black-grass has emerged in the overwinter fallow blocks. Whilst this might have been expected where populations were low last season, the same effect has been seen in plots that carried much more black-grass last season.

New for 2017 is a rye-grass plot, drilled last August following AD rye which had high levels of black-grass. Also new for this year is a November drilled plot of winter wheat. After a steady build up of black-grass over the last few years, the direct drilled block is also destined for spring barley this season.

After drilling oil radish on the same plot for three consecutive seasons, the block has been sub divided this season to see the effect of glyphosate timing on kill of the cover crop. We'll also see what effects there are on the subsequent establishment of spring barley.

"A whole range of management techniques and rotations is employed at the site to see how different approaches work together to minimise black-grass seed return."

Christine Lilly
Research and technical support manager





Successfully establishing game cover this spring

Weather permitting, game cover and wild bird seed establishment is now likely just a few weeks away. Though these crops will not be harvested, they still require the same care and attention as a cash crop and planning ahead is essential to achieve good results. Kings southern technical advisor, Marc Bull advises on how to get crops off to the best possible start.

Crop type and location often mean that game cover and wild bird seed plots need more care than other crops. They may be sited in the worst yielding, most hostile part of the field, or the most exposed site because that's the best place to present a good challenging bird. Some of our commonly grown species originate from more forgiving climates; millets and quinoa, for example, come from Africa and Spain respectively and both are grown as commercial crops in the US. These areas are very different from our increasingly volatile maritime climate. Considering various factors before and during establishment can make all the difference to overall crop performance.

Soil testing

To ensure the fundamental building blocks are in place before even planting a crop, plots should be soil tested every 3-5 years. Most crops also need a soil pH of 6.5-7 to really achieve their full potential and all crops need ample N, P & K, along with trace elements, to grow. Although we don't harvest a game or wild bird seed crop in the traditional sense, the birds will be doing just that. The crop residues will lock up nutrition in the same manner as wheat straw does, meaning limited nutrients will be available to the next crop despite having healthy indices. Compound fertilisers such as Actyva S are useful for supplying crop requirements.

Seedbed preparation

Since most of our species are from warmer climates, there is little point in rushing out to drill in March and April, when spring cash crops are often planted. This allows some time to achieve a fine, firm stale seedbed.

Patience is a virtue with plot preparation as ploughing wet soils can cause more damage than good. Ask yourself if ploughing every year is really necessary, as this can be a challenge on some of the stronger soils in spring and a min till approach may be beneficial to help prevent seedbeds baking and drying out. Remember the drought conditions back in 2011? Moisture retention should always be considered no matter how wet the winter or early spring is. Crops like maize hate compacted soils and will struggle to bust through any sort of plough or even power harrow pan, which means

the crop can only source moisture and nutrition in the top 4-8" of soil. Dig a soil pit to see if you have a healthy soil structure. If compaction is evident, a well timed sub soil would be beneficial.

If the plots are on virgin ground, i.e. straight out of arable or behind a grass ley, then a honeymoon period of good fertility and minimal weed burden will follow, but it will only last 2-4 years. With no need for spraying, this type of land is well suited to crops such as Winter Wildlife Holding Cover, Wild Songbird Seed and Sunny Daze. Stale seedbeds should always be used to help the crop get a good start.

Weed control

Plots that have been in place for some time will be slowly building a weed seed bank, especially where non sprayable mixtures have been used and even the stale seedbed approach will eventually run out of steam. Crops should be built around the weed burden so that weeds can be managed effectively going forward. It's no use planting a mixture and then wondering what can be done when the weeds are starting to smother it out; a plan should be put in place with crop protection products ready for deployment as and when needed. Mixtures such as Kings Campaign Mix and Highland Mix are useful where broadleaved weed control is needed and for grass weed control, Moir Mix.

Some people believe that a few weeds are harmless. However, while small farmland song birds may eat the odd fat hen seed, most weed species have shed their seeds long before the colder weather forces birds into wild bird seed plots, so the weed seeds are simply retained in the seed bank to create future problems. Many crops, for example slow growing kale, hate competition and their progress will be significantly impacted by weeds. Similarly if there is a carpet of weeds between rows, maize will not be able to benefit from red light, which is the light gathered by the underside of the leaves as it reflects from the bare soil.



Weeds flourishing in a stale seed bed. Time spent on preparation is a good investment.



Drilling conditions

So, you know your weed burden, have selected the appropriate crops to use and have established a seed bed in early spring. Patience will still be required in the wait for optimum soil temperatures. Millet and maize need a steady 8°C to germinate and sorghum needs soil temperatures closer to 12°C. Kale may germinate at lower temperatures but will be subject to grazing off by flea beetle, pigeon and deer if it's too cold.

In the last three springs, air temperatures haven't reached double figures until May in some areas. If we're waiting for warmth, moisture retention can be a blessing, as most small seeds can only be drilled in the top 0.5-1" of soil which will be the first to dry out.

Nutrition

Splitting fertiliser applications is recommended, with one third on the seedbed and the remaining two thirds as a top dressing just as the crop comes through. Slug populations should be monitored and addressed in both seedbed and growing crops. Growers establishing a kale based crop in the south and East of England will likely also need to spray against flea beetle until the kale has reached a minimum of one true leaf.

Seed dressings such as Synergy help get crops such as Kings Poacher Maize and Coleor Kale off to a good start. If a crop can hit the ground running it will never look back, but when they germinate and stall, they seldom reach their full potential, no matter how you manage them or what the weather does.

In times of stress, foliar feeds are fantastic. Products such as Algifol and Maize Boost help to nurse crops through the rough times, whether that be drought, floods or cold temperatures, and prevent the need to redrill.



Highland Mix provides feed and cover and can be kept free of weeds



Although we don't harvest a game or wild bird seed crop in the traditional sense, the birds will be doing just that.

For expert crop establishment and management advice specific to your own individual circumstances, speak to your local Kings advisor or call 0800 587 9797.

"Patience is a virtue with plot preparation as ploughing wet soils can cause more damage than good."

Marc Bull
Kings southern technical advisor





Maize: The importance of rapid establishment & new chemistry benefits

Groundwork ahead of maize production is the single most important factor in securing top yields and this season new chemistry offers growers a valuable post establishment weed control option too. As the establishment period approaches, agronomist Matthew Taylor highlights how to give maize crops the best start and the factors to consider before applying new herbicide, Leystar.

Establishment

Seedbed preparation is critical and should start in the preceding autumn where possible. Maize is extremely sensitive to compaction, which can cause stunting, leaf discoloration (typically purpling) and early senescence, so areas of known compaction should be removed with appropriate sub-soiling where conditions allow. A penetrometer should be used to assess compaction and pits dug to find the depth to aid correct cultivations. Be extremely careful with deep cultivations in spring as soils will be at their most plastic and more likely to smear. The Maize Growers Association (MGA) has done some work in sub-soiling between rows after drilling, which clearly has risks attached but could allow compaction to be removed once soils have dried.

Nutrition trials

Growers are now starting to experiment with placing NPK products down the spout at drilling to save a pass later on. Theoretically, this is a good idea, especially for the phosphate component as this doesn't move far in the soil and can significantly help crop uptake, but to work effectively, drill specification and logistics must be considered carefully. The MGA, among others including Frontier, has conducted trials on the use of micro-granules to replace DAP or NPK mixes at drilling. This could aid logistics, as it removes the need to cart tonnes of fertiliser and filling the drill takes less time. It also means more of the total nitrogen is applied a little later, nearer the period of maximum uptake potentially increasing utilisation. In areas with high P indices where DAP use is potentially more questionable, it would also boost early establishment without increasing indices further and the subsequent risk to the wider environment. Results from the trials have shown that



“Maize is extremely sensitive to compaction, which can cause stunting, leaf discoloration and early senescence.”

Matthew Taylor
Agronomist

micro-granules, particularly Radistart Max, can perform on par with the granular fertiliser (DAP and NPK products), so choose the product that best fits your situation.

Leystar

Dow AgroSciences has recently introduced Leystar, a pre-formulated product containing clopyralid, florasulam and fluroxypyr, into the forage maize and grassland market. These active ingredients have been available for some time, but this is the first time all three have been combined in a maize product. Label weeds include cleavers, chickweed, creeping thistle, mayweed spp. and volunteer oilseed rape and it will also provide good control of polygonums if applied early. For best results, apply when maize is between 3-6 leaf stage and before the crop is over 20cm tall. Do not apply once the buttress roots have started to develop on the first node.

On a practical note, Leystar cannot be tank mixed with any other product in maize and given that the active ingredients don't have any grass weed activity, a separate pass through the crop with a graminicide will be required. This will add cost and could limit Leystar to a 'tidy up' product.



Leystar isn't appropriate for those growing maize for AD as the formulation includes clopyralid and residues could be detected in the digestate. This may not be an issue if the digestate is only applied to cereals or maize, but could be a factor if sold on or applied to susceptible crops such as carrots or potatoes. The clopyralid in the mix also means that following crop options are limited.

For expert advice specific to your own individual circumstances, speak to your local Frontier contact.



Tackling weeds without linuron

Loss of available active substances is becoming as much of a challenge for UK farmers as the development of resistance in weeds, pests and diseases. A decision by the EU in December 2016 not to renew the approval of linuron presents just such a challenge. Linuron is an active widely used in herbicide programmes, especially by bean, potato and carrot growers. The Chemicals Regulation Division has published withdrawal dates for UK linuron products with last sales by 3rd June 2017 and last use by 3rd June 2018. In preparation for this, Frontier has been working with manufacturer Belchim on the introduction of an alternative herbicide, metobromuron. Crop production specialist, Reuben Morris, explains its advantages and practicalities.

Potatoes

Metobromuron is a substituted urea herbicide, like linuron, but without the properties that led to linuron's non-renewal. The active came through the EU and UK registration processes for use on potatoes as Praxim reasonably quickly, with a good label full rate and without restrictions such as aquatic or arthropod buffer zones. Potato trials at Frontier's Holbeach 3D thinking site from 2014 – 2016 gave Frontier agronomists confidence in both its crop safety when used with different herbicide partners and the rates needed for good weed control efficacy. Praxim's availability for use on potatoes fills the gap left by linuron's loss.

Other crops

Linuron has on label use in many crops, some of which have limited residual herbicide availability; see table 1. For instance, when linuron use has expired, growing weed free carrots and especially parsnips will be difficult. Unfortunately, it's expected to be some time before metobromuron maximum residue levels (MRLs) are set that will enable its approval for use on more crops. The EU MRL setting process commonly delays developments for up to two years.

Trials at Holbeach 3D thinking site have shown that Praxim is crop safe on potatoes up to the full label rate of 4l/ha. However, this isn't the case for other crops such as beans, for which use rates may need to be 2l/ha or below to achieve crop safety. Frontier development trials including Praxim at these lower rates have shown it will achieve broad spectrum control of weeds when used with suitable mix partners.

Working alongside Belchim, Frontier has shown metobromuron is a good replacement herbicide for linuron. Praxim is now widely applied to potatoes in place of linuron, with a reputation for good weed efficacy and crop safety without variety restrictions. We look forward to more introductions and it playing an important role for a wider range of crops in future.

Linuron label crops	Alternative on-label residual herbicides*
Beans: field, dwarf French, runner	Carbetamide, clomazone, clomazone + pendimethalin, pendimethalin + imazamox, propyzamide
Peas: combining, vining	Clomazone, clomazone + pendimethalin, pendimethalin, pendimethalin + imazamox
Carrots and parsnips	Clomazone, pendimethalin
Bulb onion, shallot, garlic, leek	Chlorpropham, pendimethalin
Asparagus, celery, celeriac	No alternative available
Parsley, fennel, dill, chervil	No alternative available

* May not be approved for all crops listed

Table 1: On-label residual herbicide alternatives for other linuron label crops.

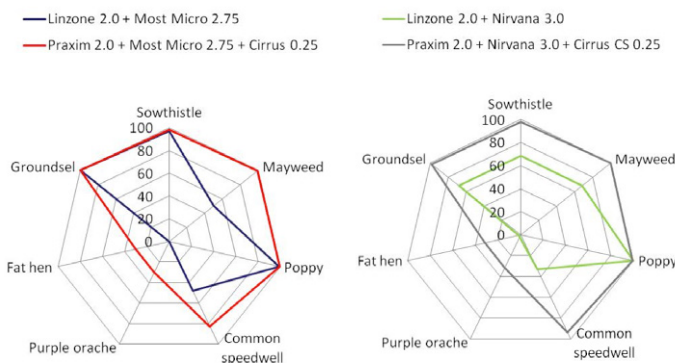


Figure 1: Praxim (metobromuron) weed control spectrum when used with herbicide partners and at a rate likely to be safe on a wider range of crops than potatoes.

“Trials at Holbeach 3D thinking site have shown that Praxim will achieve broad spectrum control of weeds.”

Reuben Morris
Crop production specialist





Effective storage is key to crop quality

As spring brings a rise in temperatures, effective store management is essential, but particularly so this year. With market forces at play and lower demand for some commodities than in previous years, many growers and commercial stores have a lot more overyeared crop in storage than usual. That makes the challenges of adhering to legislation, monitoring temperatures and preventing infestations all the more important. Quality assurance manager, Sarah Cox advises how to make sure crops stay in the best possible condition in the coming months.

Current challenges

Legislation changes and weather conditions have been among the storage challenges facing growers in recent months. Ongoing work around the presence of ergot has made consumers more aware of the fungus and additional testing must now be carried out, making adequate protection of the stored crop even more essential. Changes to fumigant legislation and labelling means stores now need to factor in a holding period of seven days after clearance, and new rodenticide rules have restricted the availability of some products. Brought about by the Campaign for Responsible Rodenticide Use (CRRU) regulations which are written to protect raptors, users now need to demonstrate their competency in using these products. The increase in media-reported prosecutions and hefty fines in relation to these new rules evidence the importance of adherence.

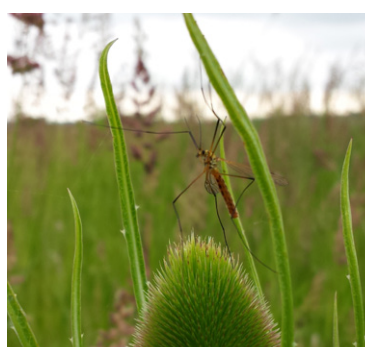
Alongside these updates, mycotoxin tests have shown some crops to be low in DON and higher for ZON, affecting their value where they are destined for use in pet food. Finally, the warmer winter reduced the ability of stores to cool grain sufficiently and impacted the development of insects, so many growers are now dealing with infestation issues.

Managing temperatures

Regular temperature monitoring is one of the best tools available to storekeepers in picking up early signs of any issues in a grain store. A rise in temperature could indicate infestation or condensation which could develop into an ochratoxin issue if neglected. Regular walking of heaps also allows storekeepers to identify potential issues with rodents and the condition of the building and bulk.

Insects

Stores need to increase their vigilance on bulks as there are more insects around due to the warmer winter and lack of colder nights for aeration. This could have a knock on effect on the development



of ochratoxin A (OTA) in the bulk as relative humidity increases and once the toxin is present, it cannot be overcome. Blending it away is illegal. AHDB's calculator is highly recommended for determining your risk of developing OTA. Frontier's labs can test for OTA; speak to your local contact for more information.

Rodents

Rodents will move into stores when it's cold and wet and if these conditions abound this spring, rodent populations could establish quickly. Contractors on site will only be able to control 20% of the problem, with the remaining 80% requiring effective proofing and hygiene. Rats need a water source, so reducing this will help. Loads will be rejected for evidence of mouse or rat faeces and possibly the whole bulk. As a minimum, growers will be expected to demonstrate that the bulk has been resampled and tested for salmonella, e.coli and listeria.

For further advice on maintaining efficient storage and managing grain, speak to your local Frontier contact.

“Regular temperature monitoring is one of the best tools available to storekeepers in picking up early signs of any issues in a grain store.”

Sarah Cox
Quality assurance manager

