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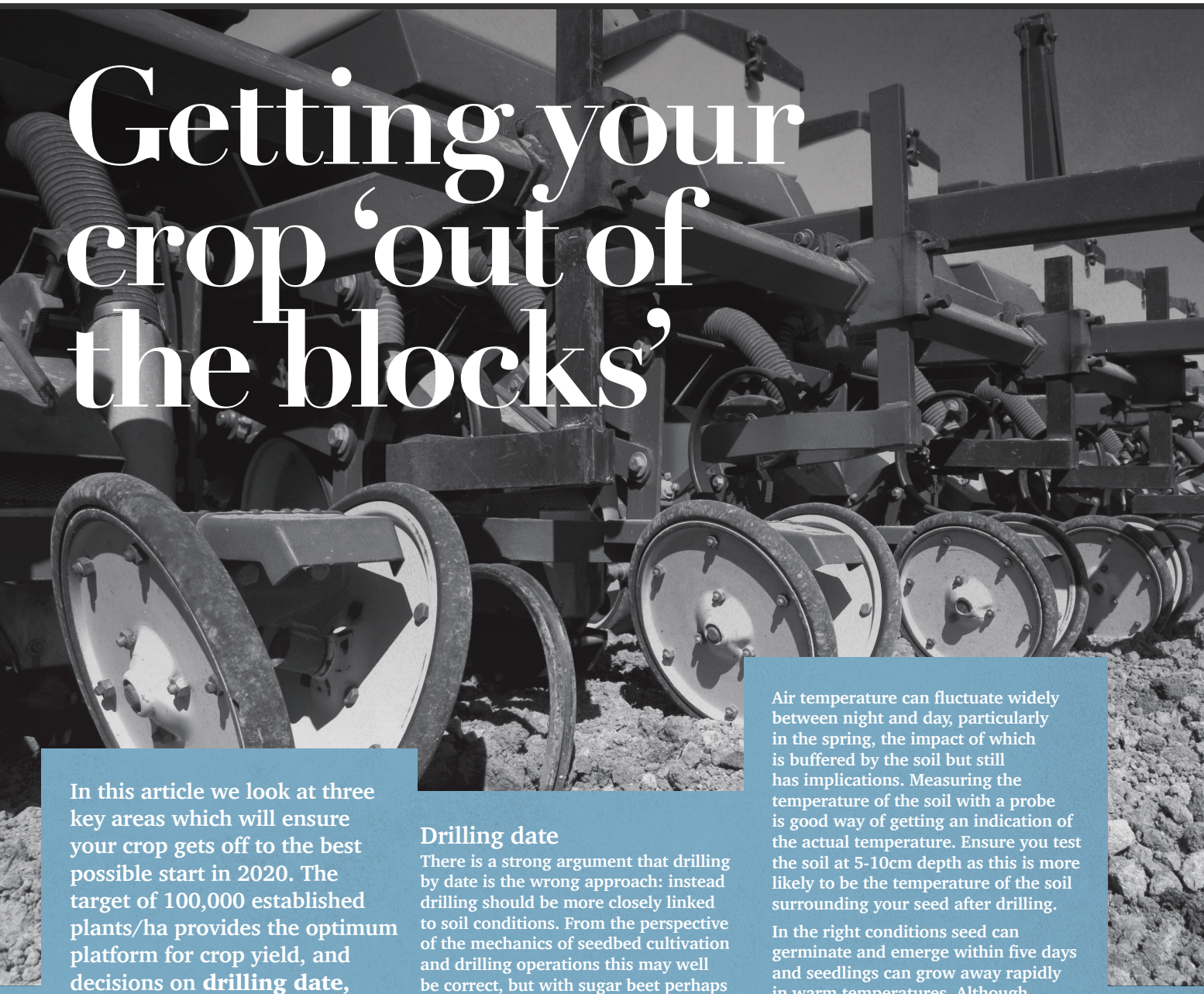
Getting your crop 'out of the blocks'



In this article we look at three key areas which will ensure your crop gets off to the best possible start in 2020. The target of 100,000 established plants/ha provides the optimum platform for crop yield, and decisions on **drilling date, seed rate selection** and **drill set-up** all play a pivotal role in helping to give us the best possible start, plant establishment and subsequent crop development.

Drilling date

There is a strong argument that drilling by date is the wrong approach: instead drilling should be more closely linked to soil conditions. From the perspective of the mechanics of seedbed cultivation and drilling operations this may well be correct, but with sugar beet perhaps the answer lies somewhere between the two, and understanding the role soil temperature plays in germination helps to explain why.

Temperature and germination

Firstly, for seed to germinate temperatures need to be above 3oC, but remember that germination still only proceeds very slowly between 3-5°C. Waiting until soil temperature is consistently above 5°C is the best strategy.

Air temperature can fluctuate widely between night and day, particularly in the spring, the impact of which is buffered by the soil but still has implications. Measuring the temperature of the soil with a probe is good way of getting an indication of the actual temperature. Ensure you test the soil at 5-10cm depth as this is more likely to be the temperature of the soil surrounding your seed after drilling.

In the right conditions seed can germinate and emerge within five days and seedlings can grow away rapidly in warm temperatures. Although seed is quite happy sitting in the soil waiting for the right conditions for germination, once the process has started seedlings that root and emerge in cold soils will be at risk of becoming stressed and potentially also at greater risk of soil diseases and pests. Whilst we have seed treatments which are designed to help deal with abiotic stress, 'taking a considered view' on **forecasted** weather conditions, especially when looking to start early, must be part of your approach.

Fig. 1. Wayne Tonge of the BBRO Trials team monitoring soil temperature prior to drilling.

There are a number of services which can also provide information on soil temperatures. For example, Germains have a soil temperature guide for sugar beet drilling on their website. This is shown below and you can see how the soil temperature last season (orance line) lagged behind the fluctuating air temperatures (red line), and it wasn't until the end of February and into early March that both soil and air temperatures came well above 5°C, despite some unseasonally warm air temperatures earlier in the month. AHDB also have the SoilMonitor tool with useful extended features including days above a selected temperature threshold, rainfall and temperature forecasts.

These temperature trackers, amongst other commercial services, are very useful for showing trends but they are often based only on a limited number of actual monitoring sites and your fields may be very different. Factors such as soil type, soil moisture level, topography and elevation can have a signficant effect so it's really worth investing in a soil temperature probe to keep check yourself.

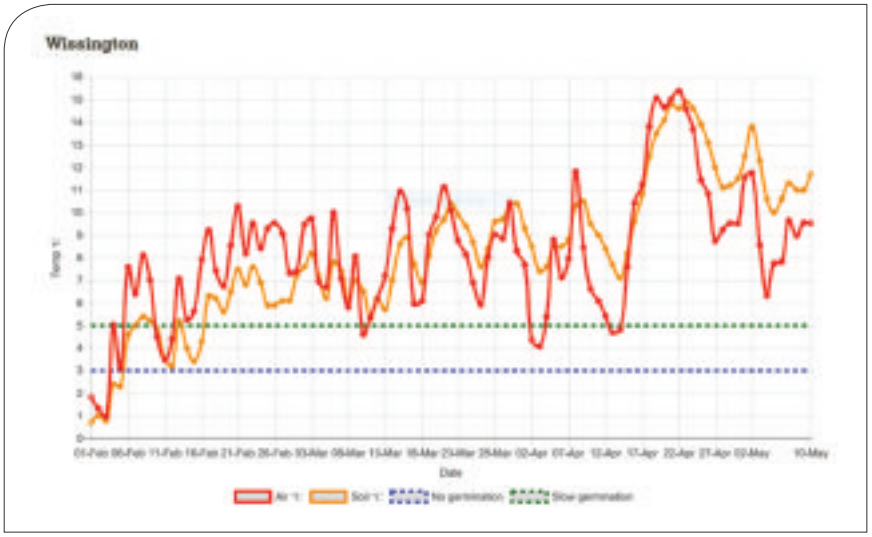


Fig. 2. Germains' air and soil monitor.

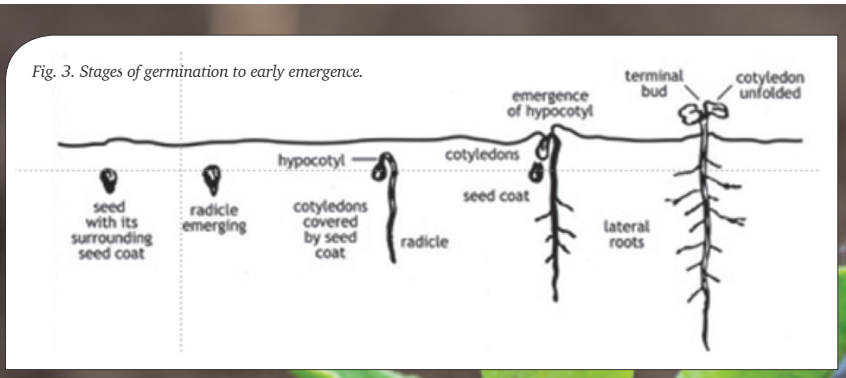


Fig. 3. Stages of germination to early emergence.

Soil moisture and germination

Whilst temperature has an overriding effect on germination, we should not forget the importance of soil moisture and to a lesser extent oxygen for germination to proceed. The swelling of seeds in contact with water moisture is a process termed imbibition; it is the first and vital stage of germination, followed by the production of a radicle and the emergence of the hypocotyl above the soil surface.

Last year we saw some issues which we believed to be related to seed being drilled into drying soils. Sufficient moisture was available at the start, but then rapidly dried out meaning the germination process was not able to complete. This resulted in cracked seed and partially emerged radicles and hypocotyls. In many situations, the process resumed (albeit some weeks later) with increasing soil moisture and temperature. In some cases, unfortunately the seed just stopped growing and was no longer viable.

Keeping an eye on soil moisture is key here and could mean that you may need to drill deeper into moist soil to reduce the risk, especially in rapidly drying soils. Also, keep a watchful eye for any prologed dry periods.

2019 presented a dilemma to growers, as bright, relatively warm days in early February created ideal conditions for forming good seedbeds, tempting some growers onto the land to drill beet. However, many were caught out by another aspect of temperature impacting on sugar beet, that needs careful consideration.

Temperatures and bolting

The second effect of temperature on sugar beet and therefore drilling date is of course the risk of bolting.

Sugar beet is a biennial plant: this means that it will only become reproductive (ie produce a flower, or as it is usually referred to in beet "a bolter") once it has been exposed to low, vernalising temperatures (for bolting) and long days (for seed production). Temperatures between 3 and 12°C are the critical temperatures for vernalisation, with temperatures in the mid-range having greatest effect and those towards 12°C the least. As a rule-of-thumb, around 40 days of vernalisation (where temperatures during the 24 hours are within this range) are required for beet to bolt. For more information on this topic please refer to the BBRO website, 'Opinions' page to access 'How do you know when to drill?'

Choose your varieties carefully when drilling early

Of course, sugar beet varieties differ in their susceptibility to bolting and this is tested by the current RL variety trials.

Early sown bolting (ESB) trials are sown separately to the main RL trials and are now drilled sequentially from the last week of February to the 5th March. The ESB figures are the number of bolters recorded from these earlier sowings for the last three years and should be used as a guide to compare varieties by growers sowing early and / or where high vernalisation (periods of cold) is expected.

The RL therefore uses mid-March as a guide to making decisions about which varieties to drill before this date. There is a significant difference in bolting between early and normal sowing dates, variety selection could therefore have a large financial consequence through bolter management costs.

Fig. 4. Bolter in field.

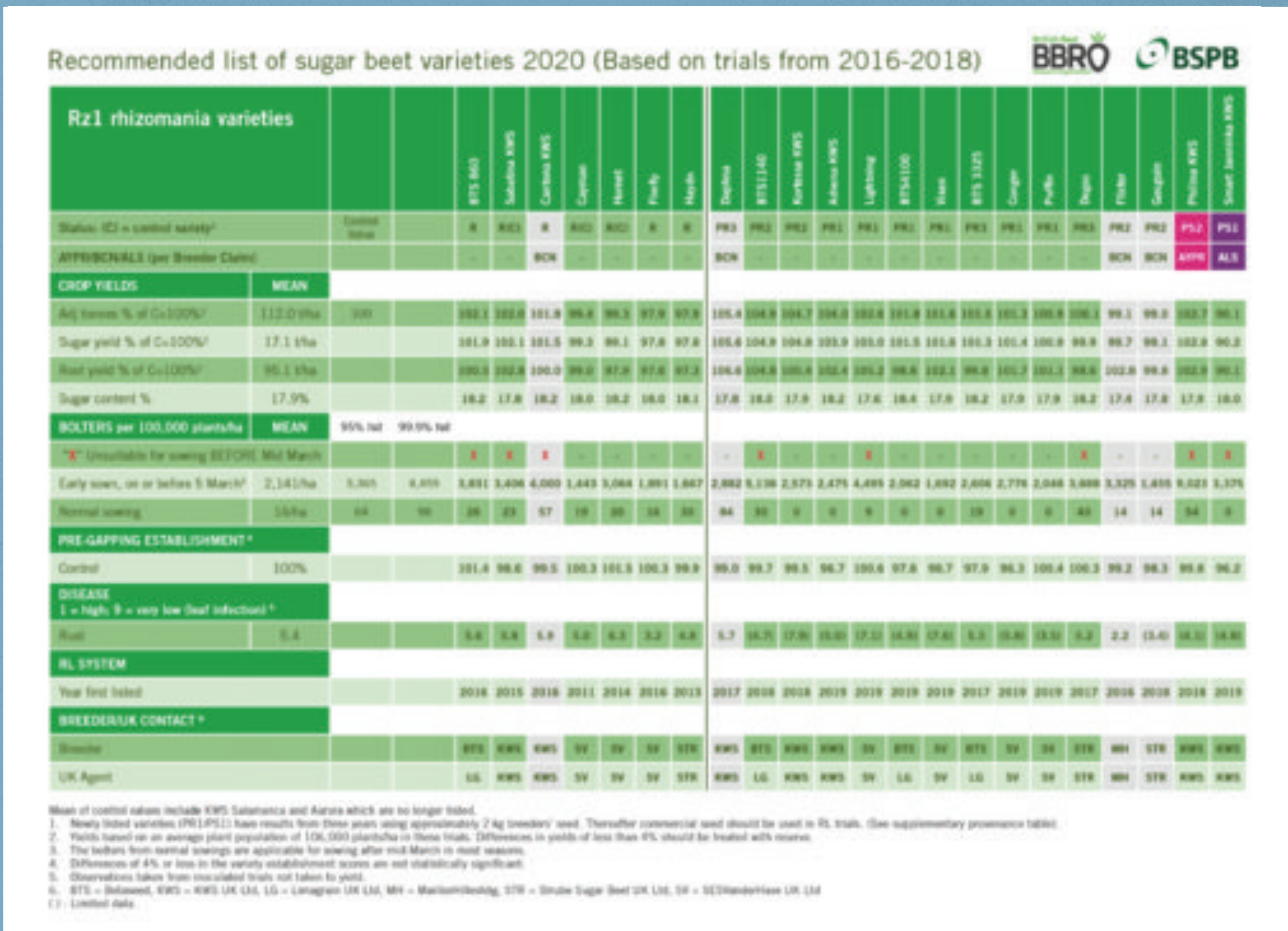


Fig. 5. 2020 Recommended List.

Having a low bolting variety in your seed order can allow earlier drilling windows to be exploited.

So, when to drill?

Having contemplated the effects of temperature with regards to drilling, when is the optimum time to drill?

Conventional advice tells us the beginning of March and, as the graph below highlights, March is the optimum time, however, historically over 30% of the UK is drilled later. Clearly, there are seasonal variations, so growers must monitor on-farm soil/temperature/moisture and be prepared to drill according to conditions and not the calendar.

A delay in planting will lead to yield loss as shown by the red line on the graph. This highlights the scale of loss based on an October harvest.

What, when… and how much?

A target plant population of 100,000 plants/ha is nothing new and the national average continues to get closer to the target. The BBRO has added further features to your BBROplus account with the addition of an updated seed rate calculator. This simple tool produces a quick answer on seed required, target seed rate and spacing whilst also allowing year-on-year establishment data to be saved, so it can be used to drive your seed order requirements for the future.

Field average

It is important to keep monitoring establishment performance, aiming for 100,000 plants/ha. Whilst it may not be practical to monitor the establishment of every field on farm, blocking soil types or geographic areas together may highlight significant performance differences that require a tailored management approach.

Headlands

Common on-farm practice, as with cereal crops is to increase seed rate on headlands, it is therefore prudent to monitor headland performance to ensure this adjustment is required. 2019 provided some great examples of why it is important to monitor seed rates across the whole field. The dry spring led to more consolidated seedbeds on headlands (from turning traffic), so where the seed rates were uniform across the field the establishment counts were actually higher on the more consolidated beds resulting in higher and more consistent plant stands. Monitoring your own headlands and wheelings can give you a good indication of cultivation and consolidation requirements.

Fig. 6. The effect of drilling date on adjusted yield.

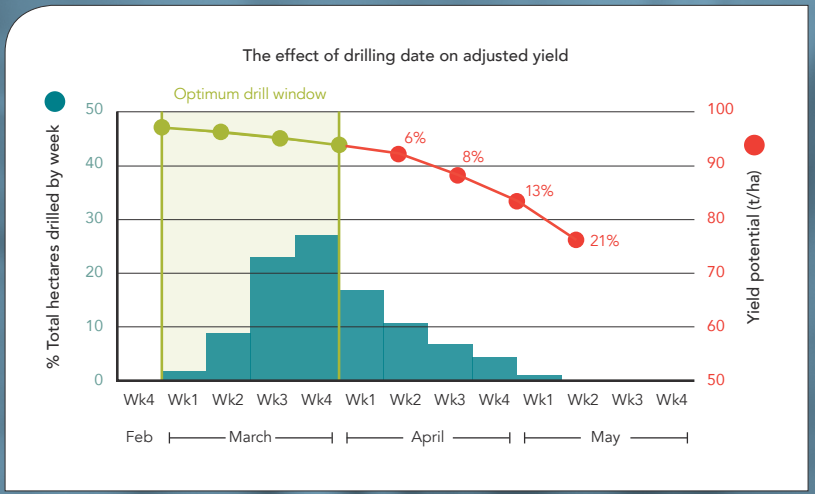


Fig. 7. BBRO Seed Rate Calculator available via BBROplus on the BBRO website.

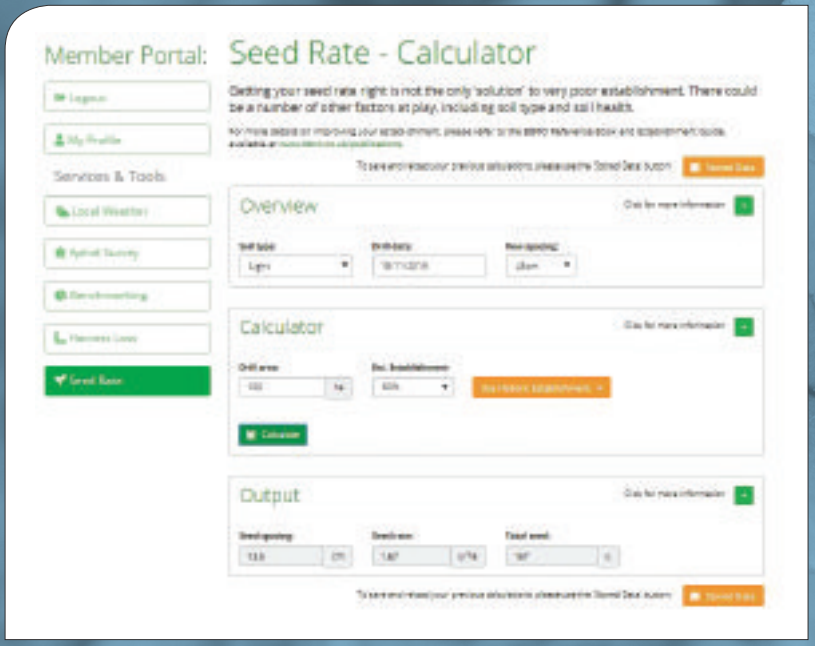


Fig. 8. Headland establishment counts showing high/even plant counts.

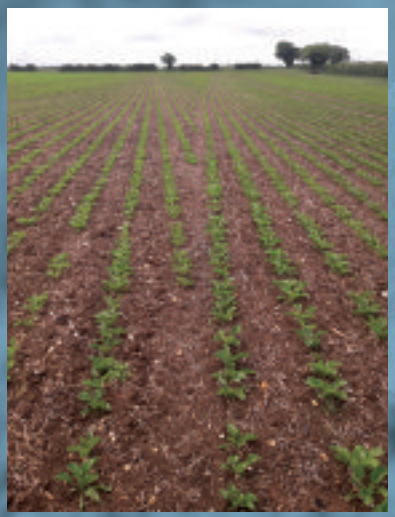
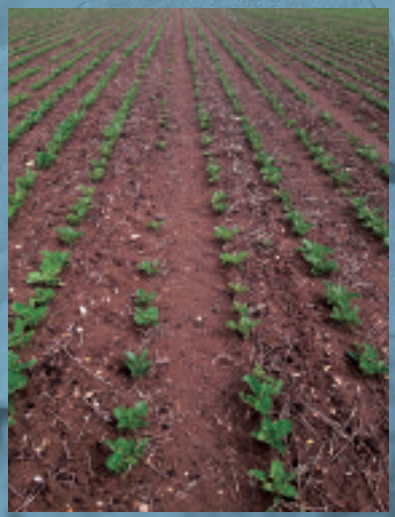


Fig. 9. Uneven / low establishment counts behind drill tractor. wheeling.



Drill settings – perfect spacing

1. Meter

When we think of seed spacing the most important factor is our seed meter, this is the first step to ensuring good plant spacing. With a wider range of meters now being used for sugar beet, including pressure and vacuum meters, it is important to understand the correct requirements for seed pools, meter pressure and, like all precision drills, ensure the correct cell wheel or disc is chosen.

Incorrect cell wheel selection is often more apparent with those buying second-hand drills. Switching between 45 and 50cm can often lead to a cell wheel with insufficient cells for higher seed rates and forward speeds. Selecting the right cell wheel is therefore the first step to maximising meter performance and therefore seed spacing.

Drill maintenance will vary between makes and models. Where drill testing is available this should be completed well in advance to ensure no unnecessary delays. For drills that cannot be tested it is important to ensure any worn components are replaced before the season begins.

2. Depth / moisture

Having achieved successful singulation and regular spacing, it is important to ensure that the seed is well placed and holds position. The importance of moisture for consistent germination is key and ensuring that the machine is drilling into a consistent moist furrow will prevent excessive seed roll and aid seed firmer and press wheel performance.

3. Firmer / press wheel

The final drilling process relating to placement, is the seed firmer and press wheels. Once placement has been achieved these components have the potential to disrupt positioning. Seed firmers should always turn freely and should be checked regularly to ensure stalling doesn't occur when drilling. When drilling into high soil moisture, it is also important to check seed firmers are running clean. If the wheel is scraped this can also lead to stalling and scrapers should be adjusted or replaced to ensure effective operation, if the wheel is not scraped it will continue to run, however it can pluck seed from the furrow or disrupt the pattern and is an indicator to wait for drier conditions.

Press wheels generally pose less risk to seed placement; however, aggressive finger and steel press wheels must be monitored for depth. Friable and loose seedbeds can lead to excessive press wheel depth with the potential to push seed and the furrow up, or even out; adjusting spring tension or additional weights should avoid this.

Fig. 10. Standard seed firming wheel.

Fig. 11. Finger press wheel disrupting seed placement in dry conditions.

With all these details checked your crop will be off to a good start.

After all this attention to detail regarding drilling, don't forget to mark up in the field where you have drilled different varieties! This will be extremely useful when it comes to looking at crops later in the season and making decisions about pesticide applications and how crops are performing. BBRO has a stock of yellow in-field markers for this purpose. You should be able to pick these up at the various early season BBRO events such as drill training or the BeetTech meetings in February.