

Beet Yield Challenge 2019

Interim report

Hello,

We have prepared a short report on what we have found out so far from 2019's Beet Yield Challenge. We are still waiting for a few BYC fields to be lifted but knowing that you will be thinking of drilling the 2020 crop very soon, we thought we should give you some feedback based on the results. Once the 2019/20 campaign is wrapped up, we will provide an updated overall report as well as individual reports for each grower.

The key messages so far from this year's BYC are:

- It was an unusual year with many growers forced into changing their plans to account for difficult weather conditions. As in previous BYC seasons, it was clear that drilling when soil conditions were right had more effect than drilling by date, with very few yield penalties linked to later drilling dates. The average yield (to date) is 88.3 adj.t/ha.
- In a few cases of early drilled crops in 2019, bolters developed and caused an issue. If drilling before mid-March, avoid using varieties that do not have bolting resistance (indicated by the red cross in the Recommended List).
- Mid-season soil and plant analysis indicated that most crops were well supplied with nutrients although a small number of fields had lower potassium and magnesium soil values, highlighting the importance of checking soil analyses when deciding on application rates.
- Average plant populations were good in 2019; however, average values masked considerable variability within fields. Be prepared to vary seed rates in line with soil conditions and types, increasing seed rates where establishment is likely to be poor. Uneven emergence on some fields may have been caused by capping or drill set-up. Check seed depth during drilling.
- Soil samples revealed about a quarter of fields had signs of beet cyst nematode (BCN). If patches of uneven growth are present in your field, check roots for cysts. Grow a tolerant variety to see how this performs relative to non-resistant varieties.
- In general, after a slow start, canopy development was good in 2019 though some crops lost canopy in the autumn. Keep an eye out for the first signs of disease and apply fungicides if needed. Rust dominated earlier in the season but significant cercospora developed later in some crops. If leaving your crop for later lifting, make sure you have varieties with good disease resistance in the fields that are likely to be left, and that you monitor for onset of disease throughout the campaign until harvest.

Yields

- So far, there has been an average yield of 88.3 adj. t/ha.
- The very dry conditions at the start of campaign (and then in the late summer), and the very wet periods in the summer and autumn, created many challenges in 2019. Harvesting was particularly difficult. Lifting of some lighter lands was brought forward with some heavier land getting delayed. The result of the wet weather can be seen in the average dirt tare so far of 7.3 % compared to 6.5 % in 2017 and 5.5 % in 2018.
- Crops were harvested across the campaign period, but assessment of yields so far suggests a general increase in yield in the later-harvested crops.
- Sugar is currently at 17.01 %, compared to 17.85% in 2017 and 18.12% in 2018
- Average percentage of yield potential achieved is currently 80%, higher than in previous years (73% and 75% in 2017 and 2018, respectively).



Drilling

Drilling date

Average drilling date was the 25th March (compared to 26th March and 16th April in 2017 and 2018's BYCs, respectively).

- In 2017, the earliest drilled crop was the 10th March and the latest was the 9th April
- In 2018, the earliest drilled crop was the 22nd March and the latest was the 11th May
- In 2019, the earliest drilled crop was the 27th February and the latest was the 7th April

One of the BYC crops was drilled early to take advantage of the dry, warm period in February 2019. Whilst the variety was considered appropriate for early drilling, there was a high number of bolters in the crop. This reminds us to be cautious of bolting, even when using a less sensitive variety. If you do need to drill early, make sure you do check on the Recommended List that the varieties you are drilling have reduce bolting risk (note that every variety will bolt if it is put under cold conditions for a significant amount of time). Our recommendation is that late drilling into a good seedbed is a better option than going too early or planting under poor conditions.



Drilling recommendations:

- Do not rush drilling. Wait until your seed bed is ready.
- If drilling early, avoid sensitive varieties (those with the red cross in the Recommended List).

Plant populations

Plant populations were assessed three times during the season (Germain's spring visit; British Sugar's Specification Field Survey; and Strube's late autumn disease assessment), and there was quite a lot of variation in these numbers. This variation may reflect intra-field variation in establishment, but there may also be the possibility of plants being lost after the six-leaf stage, possibly due to disease or drought.



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Overall, assessments show that plant populations were good and an improvement on previous years. However, as the BYC dataset grows it is highlighting the importance of within field variation of plant populations. This suggests we need to manage this more effectively, possibly by adjusting seed rates in areas where establishment is likely to be poor.

Establishment recommendations:

- There were good plant populations this year.
- Once overall plant populations have reached the target of 100,000/ha, focus on identifying fields and areas where populations may be lower and use a higher seed rate in these locations.

Nutrients

Soil and tissue samples were collected from the fields in August and early September. Analysis was undertaken by NRM. The objective of conducting soil and tissue analyses at this stage of the season was to see if we could learn anything about the nutritional requirements of crops for later harvesting.

The table below shows the number of crops where levels were outside normal range (orange boxes) and where all crops were within normal range (green boxes). Grey denotes either insufficient information available for mid-season nutrient levels or levels cannot be used reliably to indicate nutritional status.

	N	Р	K	Mg	Ca	S	В	Mn	Cu	Zn
Soil analysis	N/A	1	4	3						
Plant analysis										

Nutrition recommendations:

- In a small number of fields, K and Mg soil levels were below the normal range and may have been limiting to growth.
- It is worthwhile checking these nutrients carefully prior to drilling to ensure the correct base dressings are applied.
- Tissue analyses indicated that there were no major nutrient deficiencies at this stage of the growing season.

Canopy

Canopy development is important in determining how much sunlight is intercepted. To understand how the crops grew during the summer, we asked growers to provide photos of their canopies. Fourteen BYC participants provided canopy observations during the early summer. We used image analysis software to determine canopy cover. These were plotted against thermal time (see explanation below) and compared to how the model predicts that the canopy will develop. Further canopy measurements were taken during our autumn visit. These were measured using the phone app Canopeo – this is a quick, accurate and easy way of measuring canopy cover.



Thermal time is a way of measuring how much temperature the sugar beet has been exposed to. This enables us to compare between different BYC crops, even if they were planted on different days and measurements were taken at different times. Plant development is dependent on temperature, which is why there is a strong relationship between temperature and the expansion of the crop canopy. Stress, such as from lack of soil moisture or too much soil moisture, can lead to a slowing of development. This means that where the measured canopy is behind the expected curve (i.e. to the right of it) there is stress impacting on that growth. Reducing that stress can allow quicker canopy expansion and, therefore, greater light interception. In the late spring/early summer 2019, the indications are that the very wet conditions delayed canopy expansions, which was likely to have been more pronounced on less well draining soil. In autumn we saw a reduction in canopy for many of the crops mainly due to disease. We discuss this in the disease section.



- Some crops showed reduced canopy growth between 500 750 degree days which corresponded to early-mid June in many BYC crops. There was some very high rainfall at this time which may reflect the impact of very wet soils on the slowing of canopy growth.
- This reminds us of the need for ensuring good soil structure to facilitate drainage/infiltration.
- Loss of canopy later in the growing season was in the main due to late foliage disease development (see disease section).

Beet Cyst Nematode

At BBRO, Dr Alistair Wright is continuing his work investigating beet varietal response to beet cyst nematode (BCN). To complement his work, we sampled the BYC fields for BCN. 25% of fields had BCN. Of those fields, very few were growing BCN tolerant varieties. Some growers were unaware that they had BCN; this is not surprising as symptoms may only appear during dry conditions and only across patches in the field. Look out for cysts on roots (see image below).



Beet Cyst Nematode recommendations:

- Be BCN aware in 2020; it may be more prevalent than you think.
- Ensure you grow tolerant varieties where there is a known problem.
- Check patches of poor growth for cysts on roots in late June and July.
- Where a problem is known or suspected, be aware of the need to manage soil carefully, i.e. return spoil to field of origin and minimise movement of soil between fields. Discuss with your agronomist whether soil sampling may be appropriate.

Fungal disease

The majority of fields were visited by Contract Managers as part of the Specification Field Survey that British Sugar conducts. This survey involved disease assessments undertaken in August and September. Almost all fields had rust, with some of those fields having nearly all assessed plants infected. There was also a limited amount of powdery mildew (one infected field), ramularia (one infected field) and cercospora (five infected fields).

Fields that had not already been lifted were assessed again at the end of November by Strube. The main disease identified was cercospora with all crops having some level of infection. In a number of fields, there had been very progressive cercospora development, which resulted in a loss of canopy. Slight rust infection was also found in many of the crops, though some fields where rust infection had been very limited in September had much more severe rust infection in the November survey.



Disease recommendations:

- Continue to monitor throughout campaign (for late-lifted crops) as new disease may move into the crop. This is especially seen with cercospora.
- Think carefully about variety choice if late lifting. Use the disease scores in the Recommended List as a guide to suitability. As the BYC demonstrates, foliage disease is a key cause of lost yield potential in late-harvested crops.

Virus yellows

Virus yellows were a concern in 2019 due to the loss of neonicotinoid seed treatments. Alongside the fungal disease assessments, virus yellows were also assessed. In September, 69% of BYC fields had virus yellows with an average of 10 infected plants per 250 plants assessed (4% infected). This is broadly in line with 55% of the nearly 500 fields included in the Specification Field Survey having virus yellows with an average of 8 infected plants per 250 plants assessed (3.2% infected).

The later-season assessment found the majority of fields had small patches (covering less than 1% of plants across the field). Good control limited spread across the field with the assistance of the weather (the wet summer helped keep numbers down) and the effects of mature-plant resistance.

Virus yellows recommendations:

- Minimal impact of virus on BYC crop yields in 2019; however, risk forecast for 2020 is high so do not be complacent.
- Late-season spread of virus yellows appeared to be less progressive as a result of insecticide use, weather conditions and, of course, the effect of mature-plant resistance.
- Make the most of the available insecticides. Ensure you monitor crops and use aphid threshold for timing of spraying.