

Beet Yield Challenge 2019: Final report

2019 was the third year of the Beet Yield Challenge, and in keeping with each of the previous years, 2019 proved again that every season is different and there is always something to learn. We hope the interim report that we sent out in March gave some pointers for your 2020 crop. This final report includes an overall summary of all the 2019 BYC crops as well as an individual report based on the data that was collected on your field.



Overall BYC Yields 2019

- ❖ The average BYC yield was 90 t/ha compared to the UK average yield of 76 t/ha for the 2019/20 campaign.
- ❖ The top 25% of growers had yields of more than 94.6 t/ha.
- ❖ The highest BYC yield was 106.9 t/ha and was in the Newark factory area.
- ❖ The average proportion of yield potential achieved was 83%. This is a higher percentage than the two previous years but, as you can see from table below, there was quite range. There were a few crops that exceeded 100% - this can happen as the model is based on average data (e.g. across multiple varieties) and the weather data used may not capture specific local conditions.
- ❖ A few earlier-harvested crops were very high yielding, achieving a very high percentage of their potential.
- ❖ Crops left for later harvesting on average produced an additional 25-30% of yield but yields in several later harvested crops did not increase in line with the model due to impact of drought and foliage disease.
- ❖ Soil type was shown to have an effect in 2019, reflecting the very dry later summer conditions. 70% of crops grown on medium and heavier soils types achieved more than 80% of their potential, compared to 36% of crops grown on lighter soil types. This reflects lighter soils being more challenging to manage in drier conditions and highlights the importance of building up resilience in these soils.

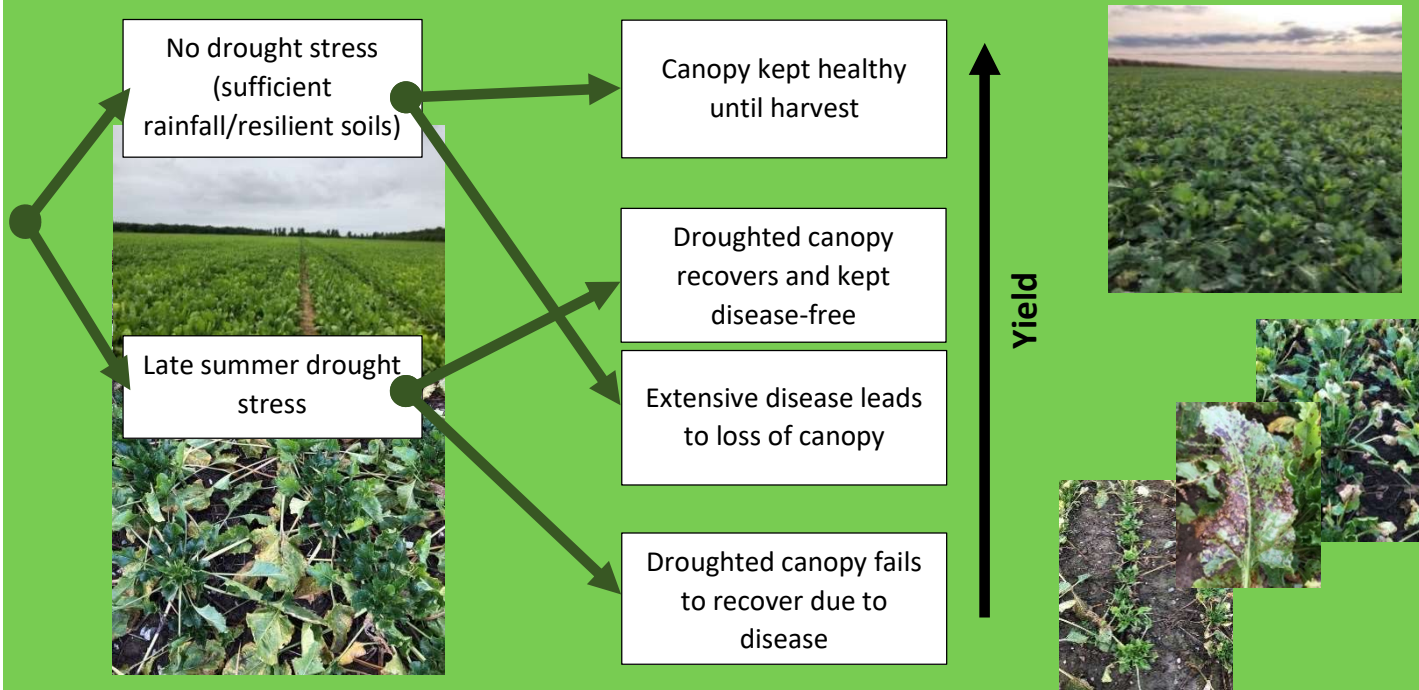
Farm no.	Factory	Model yield	Actual yield	% YP achieved	Soil category	Lifting	Varieties
1	Cantley	100.3	95.0	>90%	Light	Early	Daphna, Sabatina
2	Wissington	112.6	96.0	80-90%	Light	Late	Sabatina
3	Wissington	106.5	88.0	80-90%	Heavy	Early	BTS 3325
4	Bury	89.4	89.8	>90%	Medium	Early	Kortessa
5	Newark	122.9	88.5	70-80%	Light	Late	Kortessa
6	Newark	111.7	106.9	>90%	Heavy	Late	Kortessa
7	Newark	111.9	102.6	>90%	Medium	Late	Degas
8	Newark	103.4	94.6	>90%	Medium	Late	Degas
9	Wissington	111.4	91.0	80-90%	Medium	Late	BTS 1140
10	Cantley	104.2	97.5	>90%	Light	Late	BTS 3325
11	Bury	112.5	80.5	70-80%	Light	Early	Sabatina
12	Wissington	112.5	72.0	<70%	Medium	Late	Sabatina
13	Bury	124.2	80.2	<70%	Medium	Late	BTS 1140
14	Cantley	90.2	61.0	<70%	Light	Early	BTS 1140
15	Cantley	117.5	104.1	80-90%	Light	Late	Sabatina
16	Cantley	115.8	78.0	<70%	Light	Late	Daphna, Sabatina, Advena
17	Newark	133.7	96.3	70-80%	Light	Late	Sabatina
18	Bury	80.5	90.6	>90%	Heavy	Early	BTS 3325
19	Bury	101.1	97.9	>90%	Medium	Late	BTS 3325
20	Cantley	96.3	104.9	>90%	Light	Late	Sabatina, Cantona
21	Cantley	108.7	106.7	>90%	Light	Late	Daphna
22	Bury	118.4	86.7	70-80%	Light	Late	Degas
23	Wissington	114.5	70.5	<70%	Organic	Late	Salamanca
24	Bury	115.0	91.5	70-80%	Light	Late	Kortessa
25	Wissington	102.8	64.4	<70%	Organic	Late	BTS 860, Advena
26	Newark	110.9	103.4	>90%	Light	Late	Daphna
27	Cantley	98.1	99.5	>90%	Light	Late	BTS 1140
28	Newark	132.7	95.0	70-80%	Light	Late	BTS 1140
29	Wissington	148.9	77.7	<70%	Medium	Early	Firefly



Lifting date: Early =up till the end of October; late = November onwards

Crop growth in 2019

- ❖ Very dry early conditions resulted in slow germination, emergence and hindered initial canopy development. However, most crops eventually established well, and overall plant populations were near to the optimum.
- ❖ Rainfall in June encouraged rapid canopy growth and although many crops missed producing full crop cover by the summer equinox (June 21st) by 5-10 days, they had good healthy canopies which developed in line with the model predictions.
- ❖ Unfortunately, drought in August and in the first half of September affected many crops, especially those on lighter soils with wilting and lower leaf senescence observed in many. From mid-September when the rain started, how crops responded effectively determined the final yield:



- ❖ The persistent wet and warm weather throughout campaign increased the incidence of rust and cercospora foliar disease, reducing the crop canopy cover of many crops.
- ❖ Leaf senescence due to drought and disease resulted in plants having to remobilise sugar from their roots to regrow canopies. This resulted in low sugar content as well less light interception. The top performing late-lifted crops were those which maintained healthy canopies.
- ❖ There were several early lifted crops that produced both good yields and a high percentage of their potential. These tended to be soils with good moisture-retentive properties which were less affected by the drought and were harvested before foliage disease established.

What can we learn from 2019?

- ❖ The incidence of summer drought is predicted to become more frequent. Both 2018 & 2019 had significant drought periods and understanding how we can reduce the impact of summer drought is key. BYC observations have shown that the use of manures, retaining and incorporating straw and growing cover crops can help improve the resilience of soils to drought.
- ❖ Crops that were less affected by the drought returned some very good early harvested yields (and a high % of their potential) highlighting a favourable trade off on leaving crops longer for additional yield, against increased fungicide costs and poorer harvesting conditions.
- ❖ Understanding how crops recover and regenerate canopy after drought is important. Ensure a sufficient period (possibly about 3-4 weeks) is left for canopies to regenerate and sugar levels to increase again before harvesting. Potential variety and soil type interactions may be important and need further investigation.
- ❖ Results reinforce how critical ensuring adequate disease control during warm wet campaign periods is, to maintaining canopy cover and yield production. Many crops required 3 fungicides in 2019/20 but several crops received early application(s) and then were left either untreated or there were large intervals between applications.
- ❖ Results also highlight the importance of using variety resistance to foliar disease as part on an integrated approach to ensuring later harvested crops deliver more of their yield potential.

BYC 2019 Report		Soil type: Loamy sand
		Variety: Sabatina/Daphna/Advena

This is the individual field report for your BYC field in 2019. It compares your declared yield to the potential yield which is estimated by the Beet growth model. It shows the actual yield as a percentage of the potential. Remember that by doing this, it takes the soil type into account, especially the moisture properties; a light soil will have a lower yield potential than a heavy silt soil. The report assesses where potential yield may have been lost, based on information you have supplied, and assessments made when visited. It uses benchmarking with other BYC crops and technical information to signpost areas of improvement.

Crop yield performance

Actual yield (adj. t/ha)	Potential yield (adj.t/ha)	Actual at % of potential	Yield gap (adj.t/ha)
78	115.8	67	37.8

The colour coding of the % of potential achieved indicates crop is in compared to other BYC crops in 2019:

Lower 25%	Middle 50%	Upper 25%
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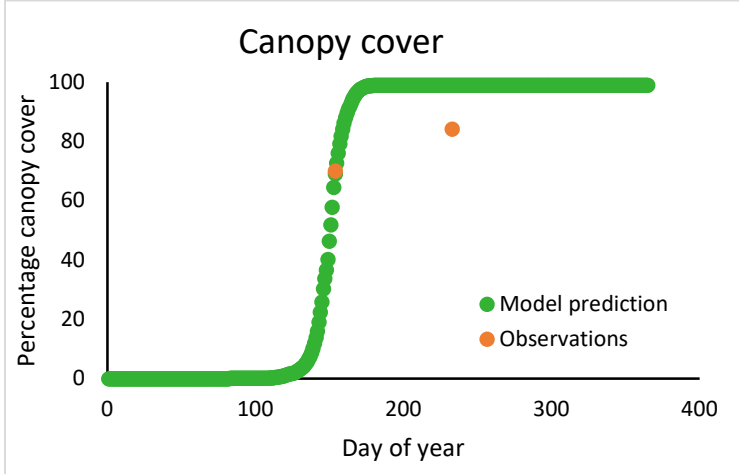
Crop development indicators

Emergence	Impact	Improvement options
Drilled 23/3/19. Good, rapid & uniform emergence by 1/4/19.	No impact	No action required

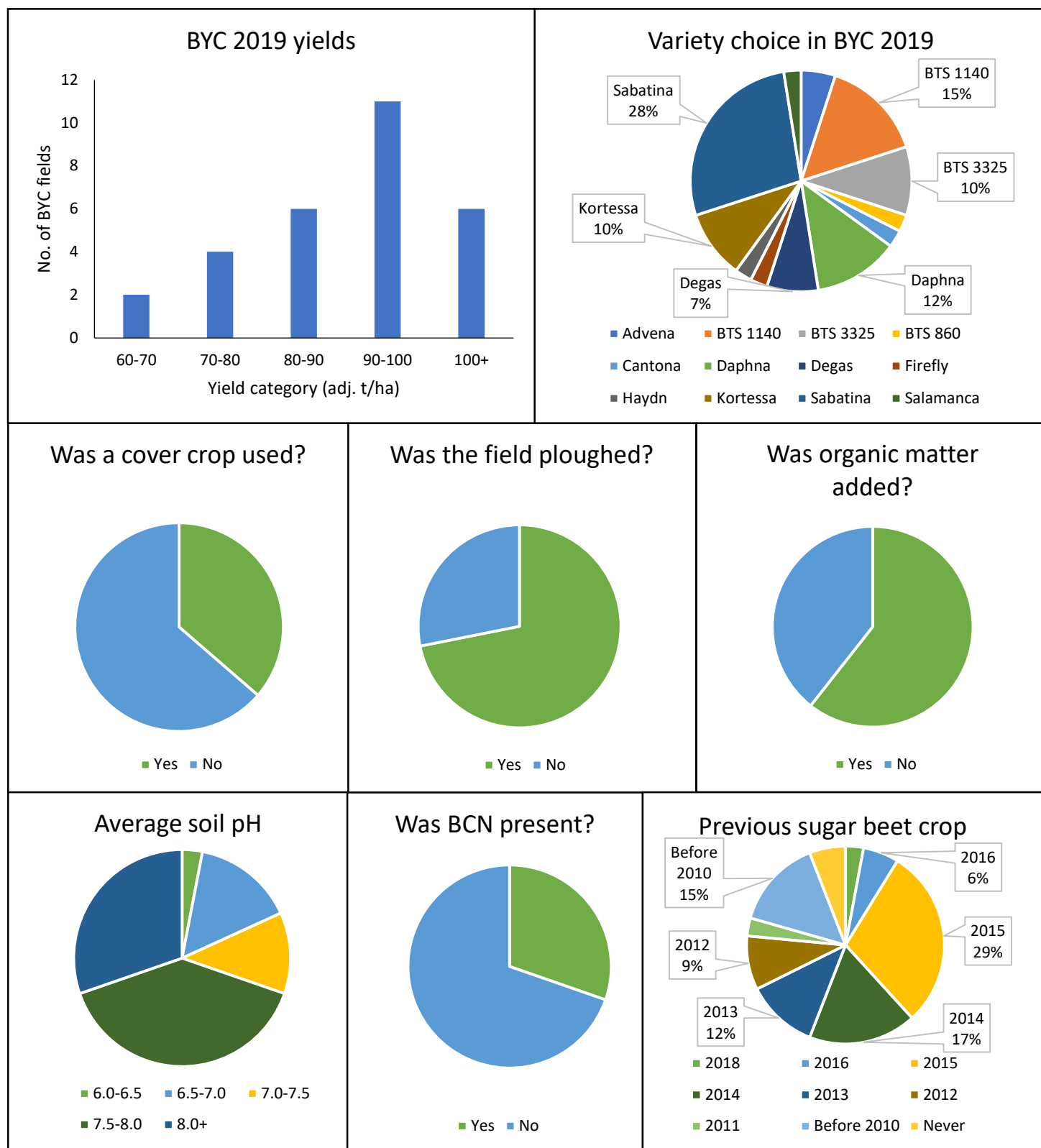
Plant population	Impact	Improvement options
114,800 plants/ha from seed rate of 1.2 units/ha	95% establishment is very good value. Industry average is 75%.	No action required

Early canopy development	Impact	Improvement options
20/5/19 good consistent development at 6-8-leaf stage. 50-60% canopy development by 3/6/19.	Canopy development in line with model, easily reaching target of full cover by summer equinox 21/6/19. Great canopy platform for root growth and yield production.	No action required

Canopy health/persistence	Impact	Improvement options
<p>84% canopy cover recorded 21/8/19. Crop wilting with some lower leaf senescence observed. Rust found on 40% of plants, 5% cercospora and <2% virus. No information on fungicide programme.</p> <p>4/12/19 visit. 70% cercospora recorded. Many plants with dead outer leaves and re-growth in centre of plants.</p> <p>High beet cyst nematode incidence was found in the field.</p>	<p>High level of cercospora/rust would appear to have reduced canopy substantially. Subject to confirmation of fungicide programme, we would need to understand why this foliage disease has been so prevalent. BBRO trials have shown that this level of disease can reduce yield by 30%. Disease increases significantly in warm, wet conditions. BCN may have impacted performance. Of your three varieties, only Daphna is BCN-tolerant.</p>	<p>End of season foliage disease has been the cause of lost yield potential. We know that yield can increase by 30-40% between September and December. The modelled yield assumes a healthy canopy through to harvest. The wet autumn of 2019 created very high disease pressure and many BYC crops were affected by later season cercospora infection.</p> <p>It is worthwhile reviewing fungicide programmes to ensure these give as much protection as possible.</p> <p>Need to review BCN situation.</p>



BYC 2019 factsheet



Acknowledgements

We would like to thank the many people who have contributed to this year's Beet Yield Challenge. In particular, we'd like to give special thanks to following people:

- The BYC Steering Committee of Darryl Shailes (Hutchinsons), Tom Clarke (NFU Sugar representative), Ben Goffin (British Sugar representative) and Philip Draycott (independent agronomist and soils expert)
- British Sugar Contract Managers
- Germains for undertaking emergence assessments
- Flora Archer (BBRO) for visiting each of the fields for a late-summer assessment
- Mark Culloden (Strube) for undertaking some very comprehensive disease assessments in November and December

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