Grower Update

ISSUE 40 – DECEMBER 2020

Burdekin Productivity Services

PRODUCTIVITY PROFITABILITY SUSTAINABILITY

Funded by Burdekin Canegrowers and Wilmar Sugar

Welcome to the December issue of our BPS newsletter. We hope you find the articles contained in this issue informative.

This issue contains:

BPS would like to wish everyone a merry Christmas and a safe and happy New Year.

The BPS office will close at 4 pm December 23, 2020 and reopen at 7 am January 4, 2021.

CHRISTMAS MESSAGE

2020 has certainly been an interesting year with a few challenges to face. However I am pleased that BPS were able to continue to provide high quality support and services to growers throughout the year, despite COVID-19. Some highlights of the year have included:

- Well attended shed meetings, with presentation of and discussion about locally relevant trial data and information
- Over 550 RSD tests were completed by BPS staff
- Around 6500 tonnes of approved seed cane was distributed across the district
- Over 470 soil and water tests and subsequent recommendations were completed for members
- Around 75 growers setup on IrrigWeb – an online irrigation scheduling and record keeping tool
- BPS supporting growers with Agtrix farming – a cane specific record keeping app/website
- Implementation of a soil test subsidy program for BPS members
- Development of nutrient management and irrigation plans for many members
- Numerous responses to grower support requests around all aspects of the farming system.

While there are also plenty of issues that BPS and the greater industry are concerned about, it is often better to focus on the things we can control or influence, and do the best we can. Please remember that the BPS staff are available to assist members with improving all aspects of productivity and profitability. There have been some recent examples of where BPS staff have significantly improved yields on farms through assistance with irrigation, soil management, weed control and variety selection. We have also provided opportunities for growers to reduce costs while maintaining productivity with improved irrigation management, nutrient and ameliorant optimisation, gross margin analysis and general farm management. Please contact any BPS staff member for assistance on your farming enterprise. I would also urge all members to take advantage of our ongoing soil test subsidy, and in the coming 2021 year, our one-off approved seed cane subsidy.

I would like to thank the staff for their dedication and hard work through the year, and wish all members a very Merry Christmas and New Year. Hopefully all get to spend time with loved ones and the weather is kind to us!

Best Wishes

Rob Milla – December 2020

2020 VARIETY TRIAL RESULTS

This year BPS harvested six variety trials, ranging from first to third ratoon. This was the final year for two of the third ratoon sites (Aerodrome and Iona); all other sites have been ratooned and will be harvested again next year.

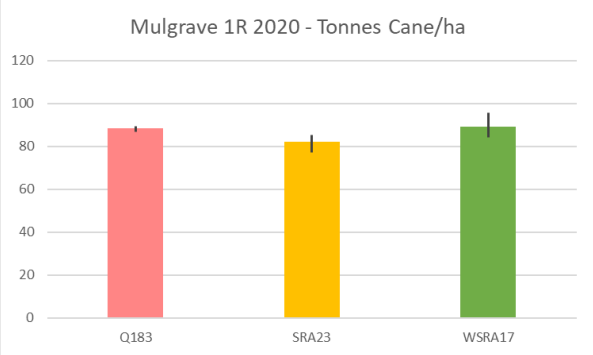
BPS would like to thank all of the participating growers and their harvesting crews for their assistance with the variety trial program.

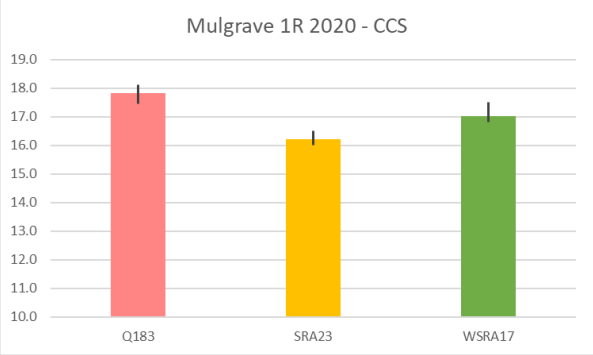
The trial results for each site include the harvest results from this year as well as the cumulative results over the life of the trial. The black lines on the graphs for the 2020 results show the range of results, that is, the lowest and highest yield for each plot.

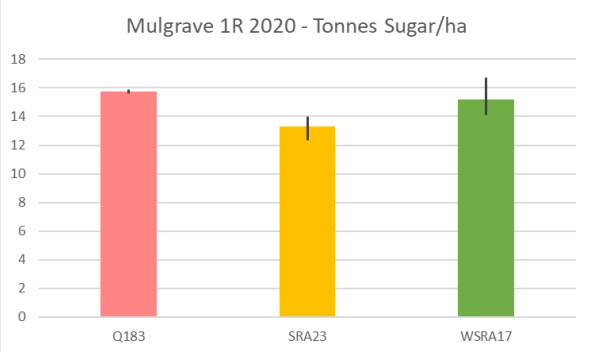
Mulgrave – 1st ratoon – sodic duplex (2A / 2Dyb) to heavy cracking clay (1A / 2Ugk)

2020 Results

- WSRA17 and Q183 both outperformed SRA23 for tonnes of cane/ha
- Q183 produced the highest CCS at 17.2
- Q183 had the best tonnes sugar/ha at 15.7; WSRA17 had 15.2 ts/ha







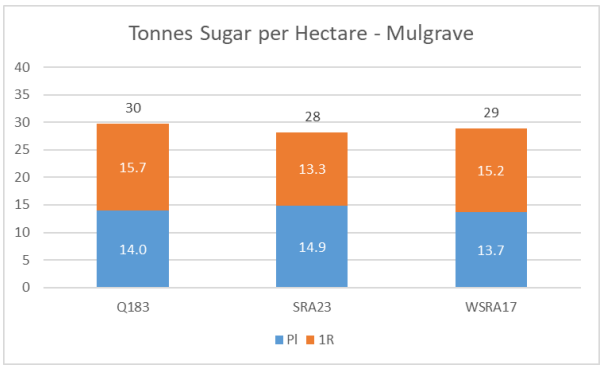
Cumulative Results

- Both Q183 and WSRA17 produced more cane/ha, higher CCS and more tonnes of sugar/ha compared to last year
- Tonnes of cane/ha for SRA23 dropped quite a lot compared to last year, but the CCS did not change. The lower cane yield translated into lower tonnes of sugar/ha

Tonnes Cane/hectare			
Variety	**Pl**	**1R**	**Total**
Q183	84	88	172
SRA23	92	82	174
WSRA17	88	89	177

CCS			
Variety	**Pl**	**1R**	**Average**
Q183	16.6	17.8	17.2
SRA23	16.1	16.2	16.2
WSRA17	15.6	17.0	16.3

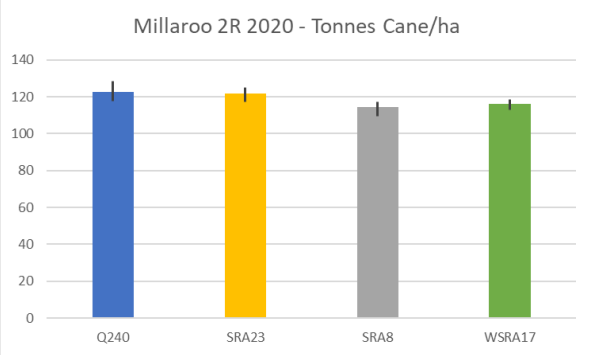
Tonnes Sugar/hectare			
Variety	**Pl**	**1R**	**Total**
Q183	14.0	15.7	30
SRA23	14.9	13.3	28
WSRA17	13.7	15.2	29

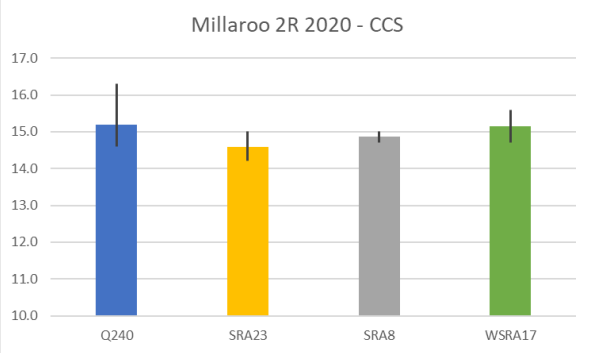


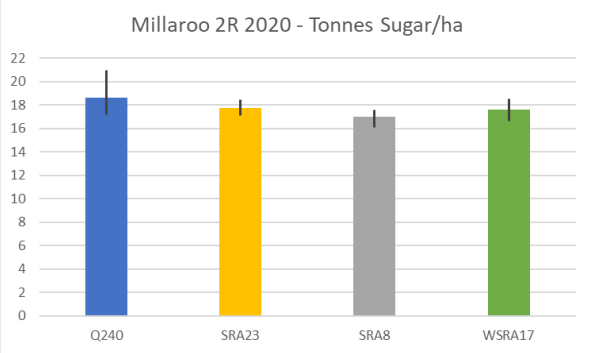
Millaroo – 2nd ratoon – clay duplex (3A / 6Dbg)

2020 Results

- Q240 and SRA23 had the highest tonnes cane/ha at 122 and 123 t/ha
- Q240 and WSRA17 had the highest CCS at 15.2 and 15.1
- Q240 had the highest tonnes sugar/ha at 18.6; while SRA8 had the lowest at 17







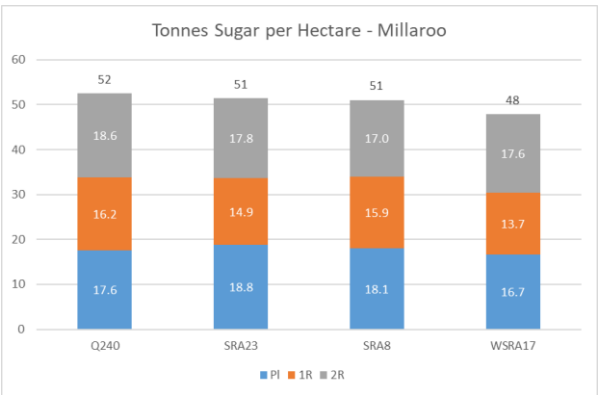
Cumulative Results

- Over the 3 years so far at Millaroo, Q240 had the highest total tonnes of cane/ha (341) and tonnes sugar/ha (52)
- Annual CCS was similar for all varieties

Tonnes Cane/hectare				
Variety	Pl	1R	2R	Total
Q240	108	110	123	341
SRA23	113	100	122	334
SRA8	110	111	115	336
WSRA17	101	94	116	311

CCS				
Variety	Pl	1R	2R	Average
Q240	16.3	14.7	15.2	15.4
SRA23	16.7	14.9	14.6	15.4
SRA8	16.4	14.3	14.9	15.2
WSRA17	16.5	14.6	15.1	15.4

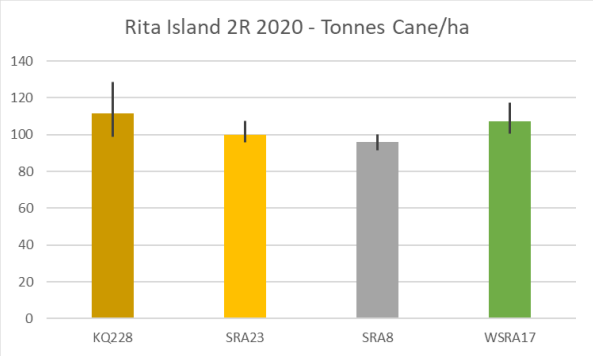
Tonnes Sugar/hectare				
Variety	Pl	1R	2R	Total
Q240	17.6	16.2	18.6	52
SRA23	18.8	14.9	17.8	51
SRA8	18.1	15.9	17.0	51
WSRA17	16.7	13.7	17.6	48

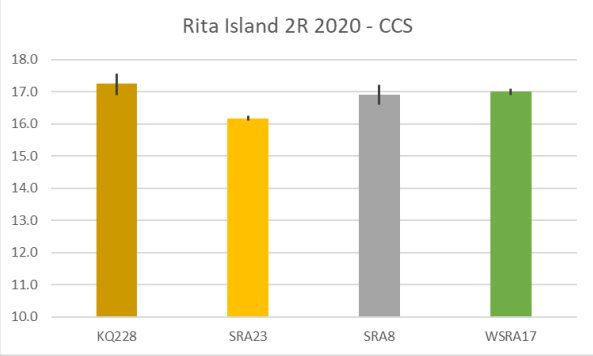


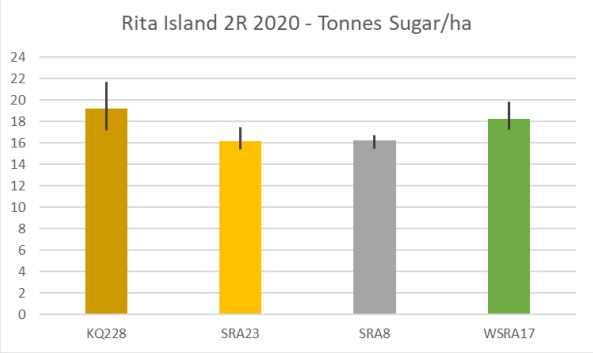
Rita Island – 2nd ratoon – non-cracking clay (4A / BUfd)

2020 Results

- KQ228 was the best performing variety with the highest tonnes cane (111), CCS (17.2) and tonnes of sugar/ha (19.2)
- WSRA17 was the next best variety; with the second highest tch, CCS and tsh







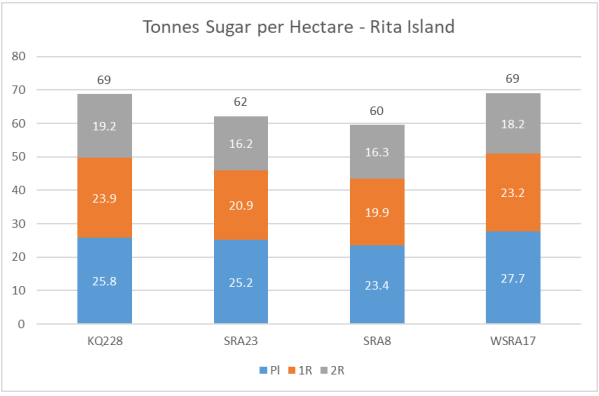
Cumulative Results

- Overall WSRA17 has produced the highest tonnes of cane and sugar for plant through to 2nd ratoon, followed by KQ228

Tonnes Cane/hectare				
Variety	Pl	1R	2R	Total
KQ228	163	141	111	416
SRA23	167	129	100	397
SRA8	172	127	96	395
WSRA17	186	141	107	434

CCS				
Variety	Pl	1R	2R	Average
KQ228	15.8	16.9	17.2	16.7
SRA23	15.0	16.1	16.2	15.8
SRA8	13.6	15.7	16.9	15.4
WSRA17	14.9	16.5	17.0	16.1

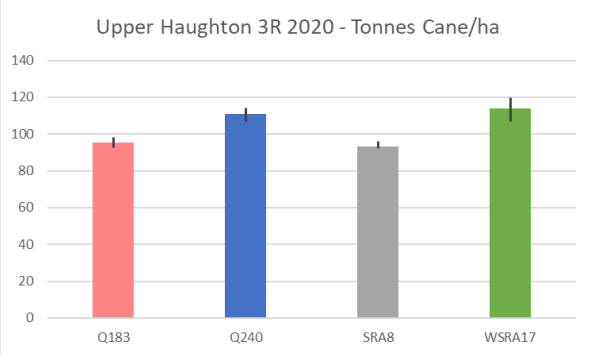
Tonnes Sugar/hectare				
Variety	Pl	1R	2R	Total
KQ228	25.8	23.9	19.2	69
SRA23	25.2	20.9	16.2	62
SRA8	23.4	19.9	16.3	60
WSRA17	27.7	23.2	18.2	69

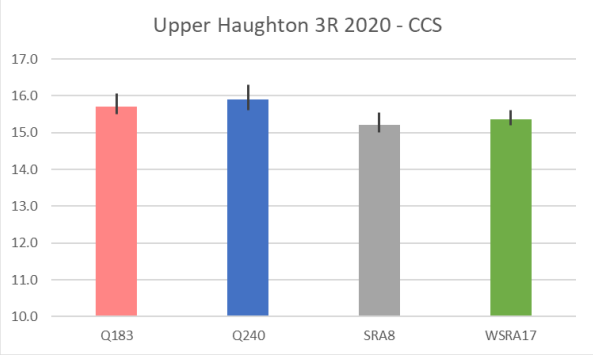


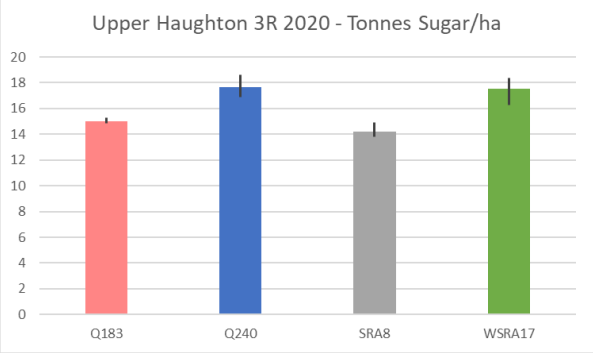
Upper Haughton – 3rd ratoon – mixed soils, mostly sodic duplex (2C / 6Dbc) and clay duplex (3A / 6Dbf)

2020 Results

- WSRA17 produced the highest tonnes cane/ha at 114 followed by Q240 at 111
- Q240 and Q183 produced the highest CCS at 15.9 and 15.7
- Q240 and WSRA17 had the best tonnes of sugar per hectare with 17.6 and 17.5







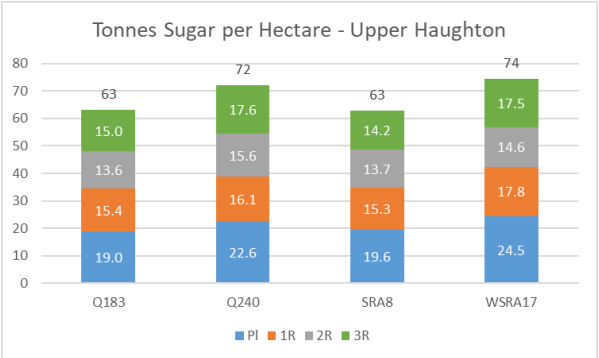
Cumulative Results

- Q240 and WSRA17 have produced the best throughout the 4 years of trial so far
- Q183 and SRA8 have consistently underperformed for cane yield
- Q183 and Q240 had higher CCS during their first and second ratoons in comparison to the other two varieties

Tonnes Cane/hectare					
Variety	Pl	1R	2R	3R	Total
Q183	151	105	93	95	444
Q240	176	111	109	111	506
SRA8	150	109	100	93	454
WSRA17	197	127	106	114	543

CCS					
Variety	Pl	1R	2R	3R	Average
Q183	12.6	14.7	14.7	15.7	14.4
Q240	12.9	14.6	14.4	15.9	14.4
SRA8	13.0	13.9	13.7	15.2	14.0
WSRA17	12.5	14.1	13.8	15.4	13.9

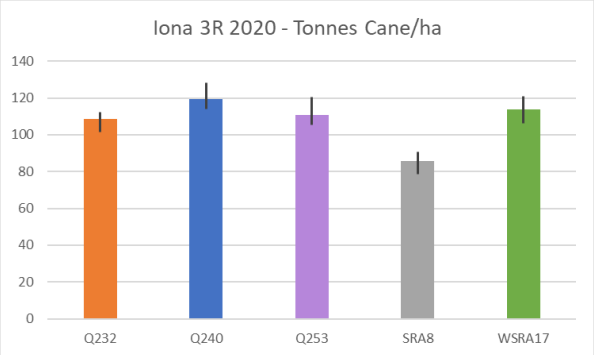
Tonnes Sugar/hectare					
Variety	Pl	1R	2R	3R	Total
Q183	19.0	15.4	13.6	15.0	63
Q240	22.6	16.1	15.6	17.6	72
SRA8	19.6	15.3	13.7	14.2	63
WSRA17	24.5	17.8	14.6	17.5	74

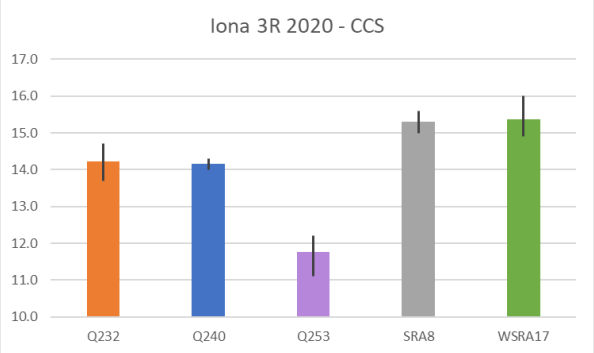


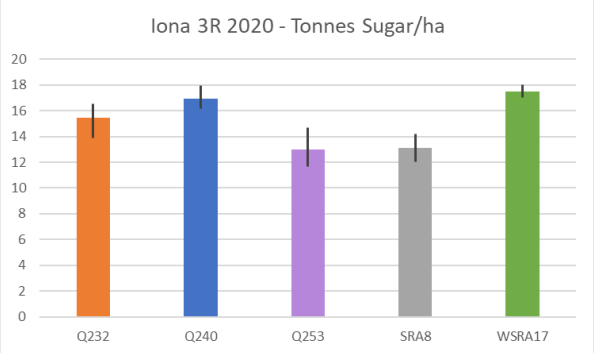
Iona – 3rd ratoon – light non-cracking clay (4B / BUmb) to non-cracking clay (4A / 6Ufb)

2020 Results

- Q240 had the best tonnes of cane per hectare
- WSRA17 produced the best tonnes of sugar per hectare and the best CCS
- Q232 and SRA8 had the lowest tonnes cane/ha
- CCS for Q253 was exceptionally low







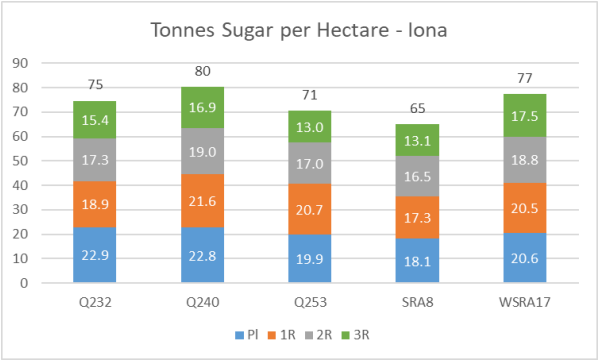
Cumulative Results

- Q240 was the best performing in tonnes of cane, followed by Q253 and Q232
- SRA8 produced nearly 100 t/ha less cane than the other varieties
- Q240 has produced the highest tonnes of sugar/ha, followed closely by WSRA17 and Q232
- Q253 had the worst CCS throughout the duration of the trial

Tonnes Cane/hectare					
Variety	PI	1R	2R	3R	Total
Q232	191	144	126	109	570
Q240	182	151	131	120	583
Q253	182	158	128	111	578
SRA8	139	118	110	86	452
WSRA17	165	138	122	114	539

CCS					
Variety	PI	1R	2R	3R	Average
Q232	12.0	13.1	13.7	14.2	13.3
Q240	12.5	14.4	14.5	14.2	13.9
Q253	10.9	13.1	13.3	11.8	12.3
SRA8	13.0	14.7	15.0	15.3	14.5
WSRA17	12.5	14.9	15.4	15.4	14.5

Tonnes Sugar/hectare					
Variety	PI	1R	2R	3R	Total
Q232	22.9	18.9	17.3	15.4	75
Q240	22.8	21.6	19.0	16.9	80
Q253	19.9	20.7	17.0	13.0	71
SRA8	18.1	17.3	16.5	13.1	65
WSRA17	20.6	20.5	18.8	17.5	77



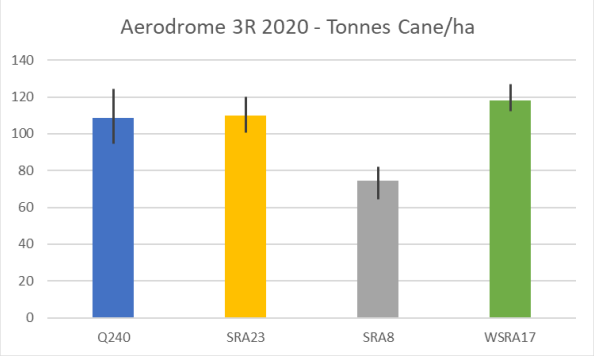
Aerodrome – 3rd ratoon – light cracking clay (1A / RUgb)

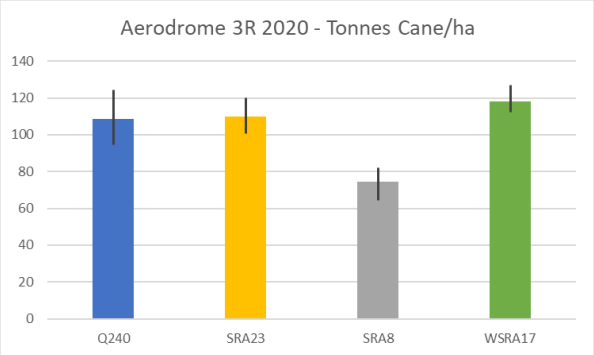
2020 Results

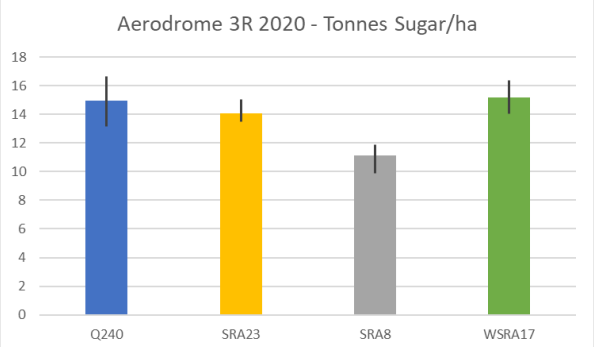
- WSRA17 produced the highest tonnes of cane/ha at 118, SRA8 had the lowest at 74
- SRA8 had the highest CCS at 14.9
- WSRA17 and Q240 had the best tonnes of sugar/ha at 15.2, SRA8 had the lowest at 11.1

Cumulative Results

- Over the life of the trial, WSRA 17 had the best tonnes of cane/ha (512); SRA8 had the lowest (409)
- Despite large differences in total tonnes of cane, Q240, SRA23 and WSRA17 all had very similar tonnes sugar/ha



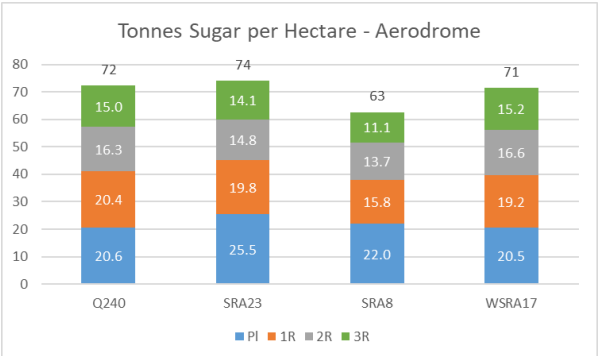




Tonnes Cane/hectare					
Variety	PI	1R	2R	3R	Total
Q240	155	124	101	108	488
SRA23	170	124	99	110	503
SRA8	150	99	85	74	409
WSRA17	164	123	107	118	512

CCS					
Variety	PI	1R	2R	3R	Average
Q240	13.3	16.5	16.1	13.8	14.9
SRA23	14.9	15.9	15.0	12.8	14.7
SRA8	14.6	16.0	16.1	14.9	15.4
WSRA17	12.5	15.7	15.6	12.8	14.1

Tonnes Sugar/hectare					
Variety	PI	1R	2R	3R	Total
Q240	20.6	20.4	16.3	15.0	72
SRA23	25.5	19.8	14.8	14.1	74
SRA8	22.0	15.8	13.7	11.1	63
WSRA17	20.5	19.2	16.6	15.2	71



RATOON STUNTING DISEASE (RSD) UPDATE

Ratoon stunting disease was first discovered in Australia in 1944 and can now be found in all cane growing regions of the country. It is an invisible issue in the sugar cane industry, as it is a disease you cannot see and without proper testing is almost impossible to diagnose. The only signs that the disease presents are:

- Stunted growth
- General poor look to the plant

RSD is caused by the bacterium *Leifsonia xyli spp. xyli*. The bacterium itself does not cause too much damage to the plant, however in large numbers they can block up the xylem of the cane stem. The xylem of a plant is the transport system for water and nutrients from the roots to the leaves. If this pipe is blocked, then the plant cannot transport nutrients and water around its system. On top of this, the plant's response to the bacteria is to send large amounts of sap through the xylem to kill the bacteria in its system. This can also cause a blockage within the pipes of the plant. As far as researchers can tell, all sugar cane varieties are susceptible to RSD. Some however are more tolerant, e.g. Q208. Yield losses have been found to be worse in non-irrigated regions and can account for greater than 45%.

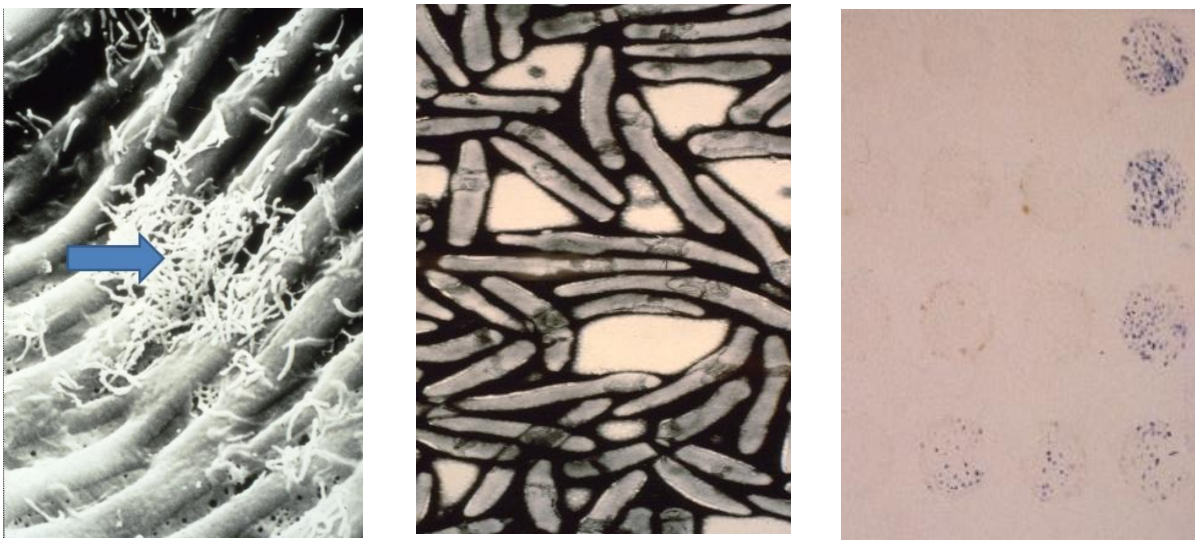


Figure 1 - RSD Bacteria in Xylem (left); Microscopic view of RSD Bacteria (centre); and RSD bacterium that have been stained blue within the xylem of a sugar cane stalk (right) – the more blue dots there are, the more RSD is present.

RSD can be spread very easily and can survive up to 12 days on a surface, even when dried. As the bacteria exist in the transport channels within the plant used for transferring water and juice, the disease is transmitted mostly via cross contamination of plant juices and plant material. The issue with the disease is that almost anything that has been in contact with infected juice or sap and has not been properly disinfected/sterilised can be a carrier for the disease. This includes:

- Planters
- Cane knives
- Harvesters
- Fungicide dips
- Break pushers
- Stool splitters

For example, if a harvester was to harvest an infected crop, then harvest through a clean crop without proper sterilisation and washing down, then the clean crop could get infected. This concept applies to all machinery that encounters the disease and is not properly cleaned.

How do we detect and control this disease?

Sap from the xylem of sugar cane plants is sampled many times throughout a block. These samples are then sent to a laboratory where qPCR (quantitative polymerase chain reaction) test uses DNA analysis to determine whether a crop is contaminated with RSD. This test is highly sensitive and accurate.

The disease cannot be removed from a crop once established, but measures can be taken to control the spread. The first and most important control method for the control of RSD is to purchase approved seed cane. This way you are starting with a crop that is clean of RSD. Volunteer cane can harbour RSD and volunteers need to be controlled before planting approved seed. The next is testing for the disease, if a crop can be identified as being contaminated, then steps can be taken to prevent the spread. All equipment that encounters infected cane must be cleaned and then sterilised. Chemicals such as methylated spirits (70%) or Sterimax can be used to sterilise equipment. Cleaning of mud and cane residue must be performed before the application of these chemicals however, as dirt and grime make disinfection ineffective. RSD bacteria have also been isolated from fungicide dips. To prevent further spread dips should be dropped and cleaned after completing each paddock.

The future of RSD testing holds many possibilities. One of the most promising analysis tools that is up and coming is NIR (Near-infrared spectroscopy). NIR is already being used in some mills to determine sucrose levels, fibre and moisture content. Research is underway to see whether NIR could also be effective at detecting RSD.

Other research being conducted in the Wet Tropics is seeing if RSD can be tested for in the juice lab. This would provide a very good overview of the amount of RSD within an area because mills receive all the sugar cane within a region with GIS data assigned to the crop and bin. If analysis were able to be performed in the mill, RSD could be detected early and assigned to specific bins, plants and regions.

As published in BPS' previous newsletter, the number of RSD positive blocks has increased significantly in the last 12 months. It is highly likely there will be a further increase in 2021 - just like COVID-19, we need to 'flatten the curve' of RSD infections! Control is quite simple:

- Regularly purchase approved seed cane
- Ensure fallows are free from volunteers and don't plough-out and replant into infected blocks
- Clean and sterilise equipment between blocks and farms.

BPS is conducting increased monitoring for RSD in the district, as well as providing extra assistance to growers who have infected blocks. Please contact any staff member from BPS if you have questions or concerns regarding RSD.

FALLOW MANAGEMENT

The fallow period is an important part of the cane cycle. It provides a break in the life cycles of cane pests and diseases particularly RSD if the fallow block is kept clean of volunteer cane. Fallow also allows blocks to be relevelled and potentially joined to make overall management easier. It is also a great opportunity to manage hard to control weeds such as itch grass, sorghum and nutgrass. When it comes to fallow options there are two main choices: a bare fallow; or a cropped fallow. Fallow crops can either be cover (or green manure) crops or a cash crop. In the Burdekin legumes are the most popular fallow crops, however over the last year we have seen an increase in alternative crops such as sunflowers, forage sorghum, grain sorghum and multiple varieties of legumes. Biodiversity in the fallow period is beneficial to soil health and can provide an income if managed correctly.

If major earthworks are necessary, then a bare fallow is really the only option. However, it is still often a good idea to maintain some cover on blocks that are at risk of flooding. A bare fallow may also be appropriate if there are specific weed problems that are difficult to control in a cropped situation. For example, nutgrass can be controlled with glyphosate in a bare fallow, and this will reduce the weed pressure going into the next cane crop.

If relevelling is not necessary, or if it can be completed early, then a cropped fallow becomes an option. It is important to decide on the end use of the crop before planting. This will allow time to also consider how the residue will be managed at the end of the fallow period. For cover crops it is generally recommended that they be mulched and the residue left on the soil surface, rather than incorporated. Another option if a legume crop has been grown is to plant directly into the pre-formed bed post-harvest, retaining the stubble and reducing the number of cultivations required. If they must be incorporated, this should occur at least 6 weeks before planting to give the green material time to break down in the soil and reduce the risk of pest damage which can occur if there is too much green organic matter in the soil, symphylans are often the culprit in this case.

Agronomic considerations for growing legumes to grain

Legume crops that are grown for grain require a much higher level of management than cover crops. It is important to make the decision on whether a crop is going to grain before planting, not halfway through the growing season. Some questions you should ask when considering planting a grain crop are:

- Am I prepared to invest the time and money required to grow a successful grain crop – e.g. water, insecticides, agronomic advice, harvesting and marketing costs?
- What are the marketing options or requirements and will this affect the choice of crop or the variety?
- Are agronomic services available?
- Will my choice of cover crop affect when I can plant cane?
- Are harvesting contractors available?
- How will I manage the residue? Will the header spread the chaff or will it be concentrated in windrows?
- Can I plant through the stubble or will I need to cultivate?

Growing legumes through to harvest can be beneficial to your farming business. The most important part of this is to be organised and understand not only the growing of the crop but also the documentation requirements post-harvest, particularly maximum residue limits (MRL) of chemicals which are being used on your crop as this affects the sale. Always talk to the buyer of your grain and read chemical labels.

WHAT IS SOIL?

When we talk about soil, what are we really meaning? Over the next three newsletters we are going to explore the different parts that create soil.

Soil is more than just a matrix that holds plants up. It is a complex combination of biological, chemical and physical components and processes. These processes influence the soil structure, which in turn affects crop growth. “A well-structured soil allows free air and water movement and good penetration of the soil by the plant root system” (Price, 2012). In this article we are going to look at soil biology.

The living part of the soil is still being discovered today with lots of research being done in this area. Soil health has gained a lot traction in industry recently because there has been a shift in thinking about soil, people have started asking more questions and investigating how the living part of the soil is linked to the physical and chemical. Looking after the health of your soil is a long-term investment. Zonal and strategic cultivation help preserve the microbial and fungal life in the soil.

In the picture you can see evidence of mycorrhizal fungi, this image was taken in the Burdekin by BPS.

If we didn't have a living soil, what would we have? It would most likely be like the shed floor, compacted and with no structure.

Let's think of the soil like a house. The framing and basic structure is the organic matter. This only makes up a small component of the soil but it has a big impact by lowering the bulk density of the soil, improving water infiltration, drainage, water holding capacity of the soil and it gives the soil better structural stability. In the house the electrical cabling is the soil food web. It is made up of many components, here are a few from largest to smallest. The largest are the macrofauna i.e. earthworms, centipedes and ants. They are like the architects of soil and they play a huge role in retaining structure. Next are the mesofauna which includes mites, symphylans and pot worms; they are small but can still usually be seen by eye. They commonly feed on organic matter and it is well known that symphylans can be a pest in most agricultural crops. Microfauna are small enough that you would require a microscope to see them. One of the best-known examples of microfauna are nematodes which can be classified into two groups, free living (good guys) and plant parasitic (root knot and lesion). Microflora such as bacteria, archaea and fungi make up the smallest of the groups. Fungi is like the road network of the soil joining everything together. Some fungi also have the ability to create a relationship with the plant. In this symbiotic relationship they share nutrients and sugars, the most well-known fungi to do this is *Arbuscular mycorrhiza*.

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