Study of Total soluble solids (TSS) variability over time on table grapes cultivars Autumn crisp and Sweet Sapphire.

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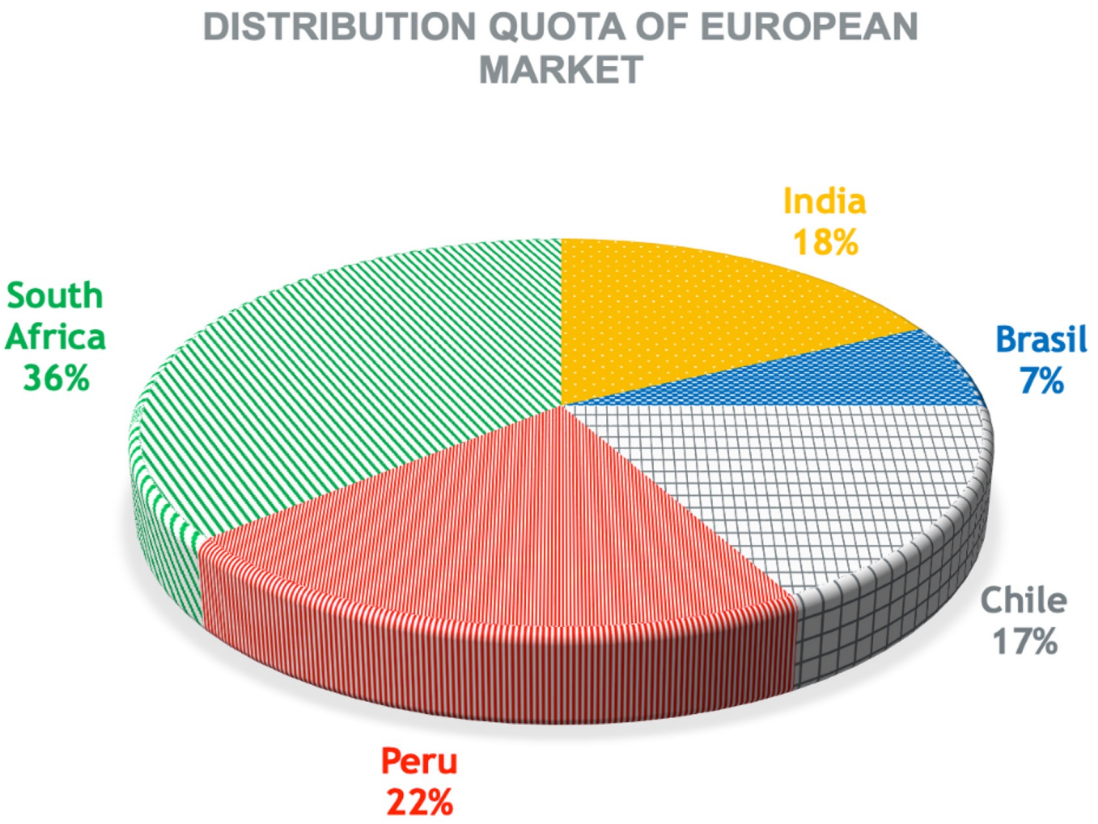
1. Introduction/Context: Table grape business challenge.

Dutch imports of table grapes in 1000 tones	2017	2021	change in %
Total non-European supply	251	413	64%
South Africa	83	154	85%
Peru	29	81	177%
India	51	71	39%
Chile	39	33	-17%
Brazil	17	29	69%
Egypt	22	27	20%
Namibia	7	17	162%

Source: ITC Trade Map available online in; The European market potential for table grapes | CBI



Source: ORIGIN FRUIT DIRECT GRAPE WEEKLY VOLUME REPORT 2018-2019

1. Context / Introduction.

Bunch Asynchrony

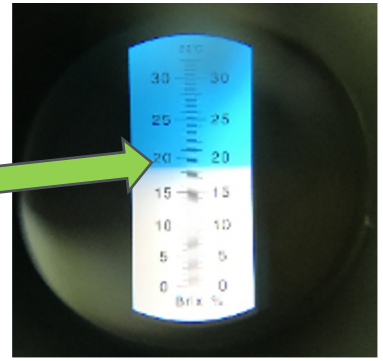
Fruit Ripening Asynchrony

Chemical variability among berries of same bunch

It is a challenge for the fruit ripening monitoring process

1. Context / Introduction

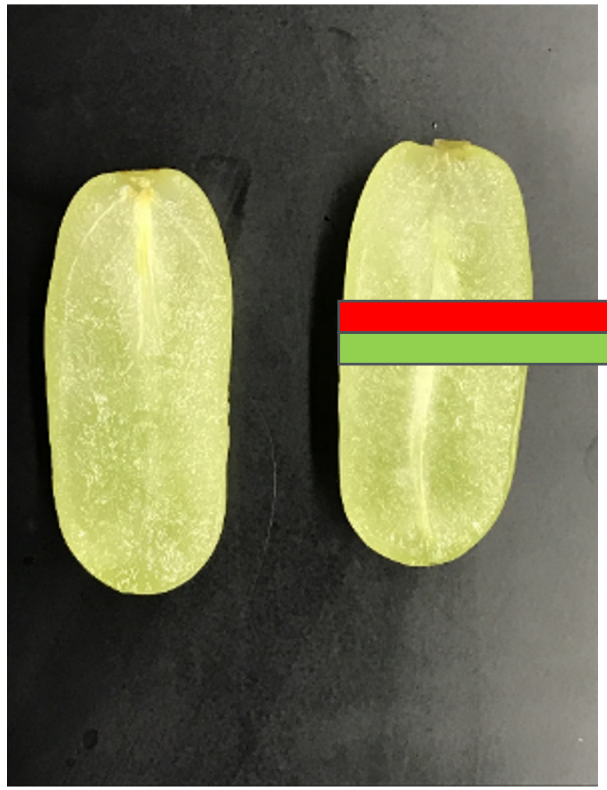
Brix sampling collection

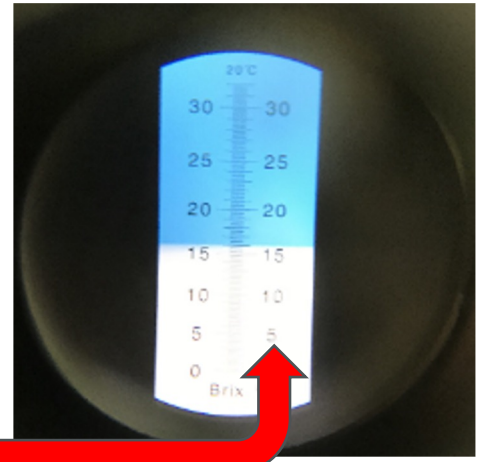


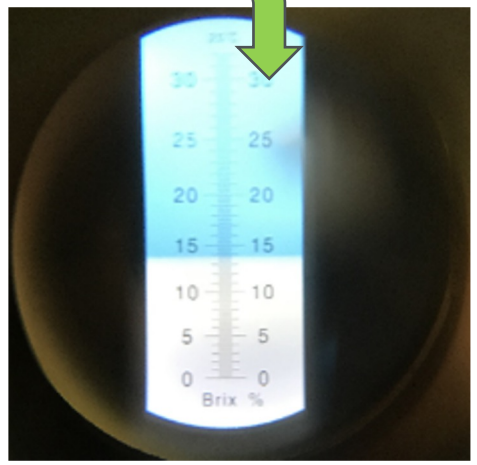
2.8° Brix difference

1. Context / Introduction.

Berry Asynchrony



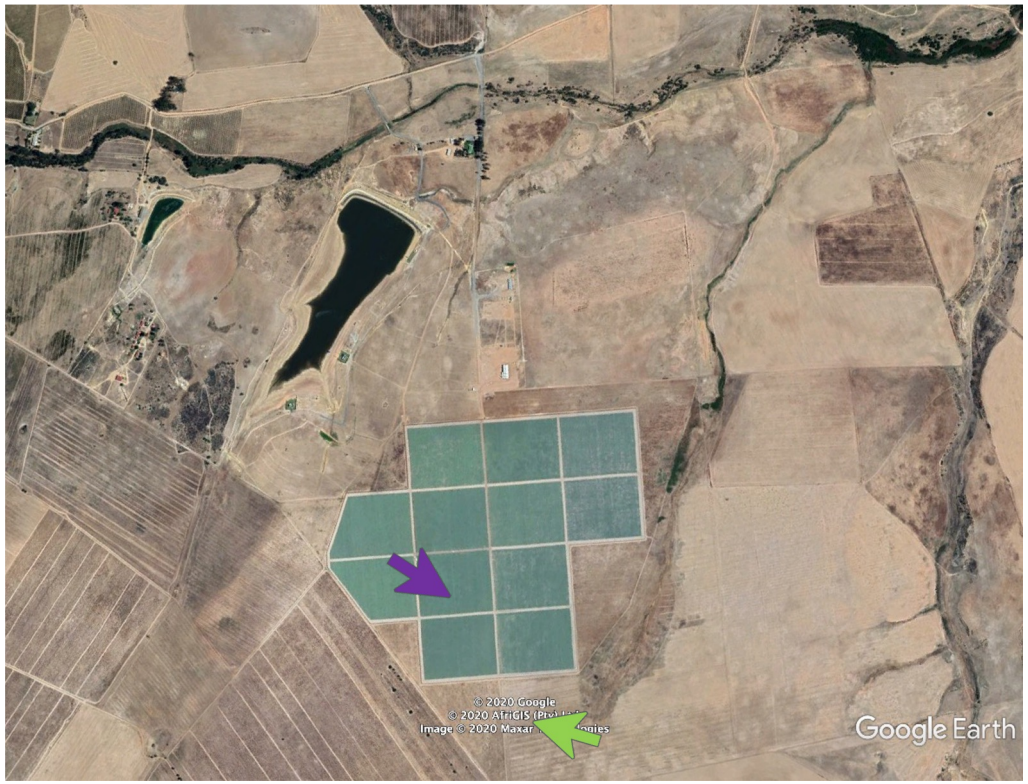




2. Methodology.

Experimental site was located at Lac Du Soleil Farm
GPS coordinates 32°44'39.6"S; 18°50'16.2" E
Piketberg, W.C.

Block 12
Sweet Sapphire /Ramsey
2017

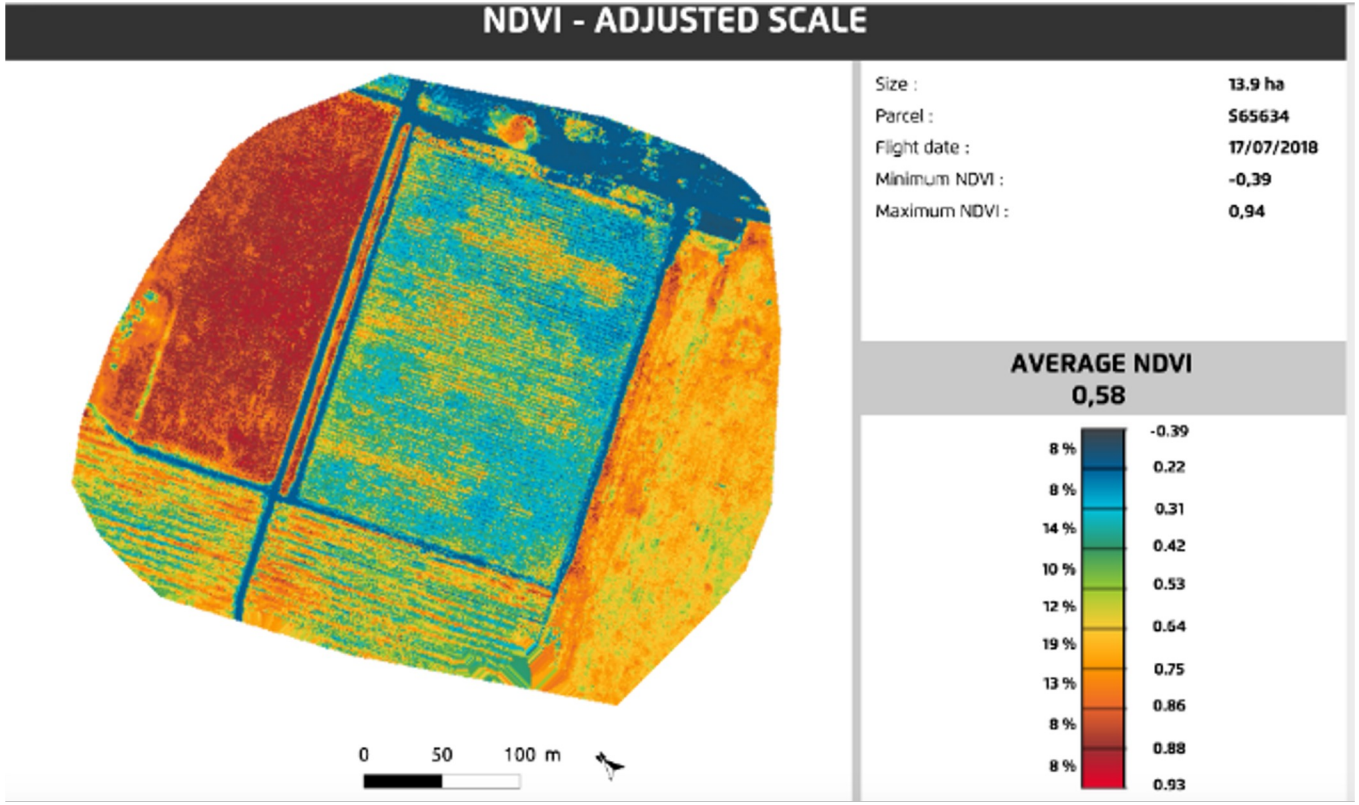


Source: Google Earth Pro 2020

Block 07
Autumn Crisp/Paulsen
2016

2. Methodology.

Experimental site determination with NDVI monitoring



Drone with MSI camera build on was use to determine plant uniformity of the plots. In order, to determine where to select the plants.

2. Methodology.

Plant selection;

9 plants were selected per each variety

Block 07
Autumn Crisp/Paulsen
2016

Block 12
Sweet Sapphire /Ramsey
2017

2. Methodology.

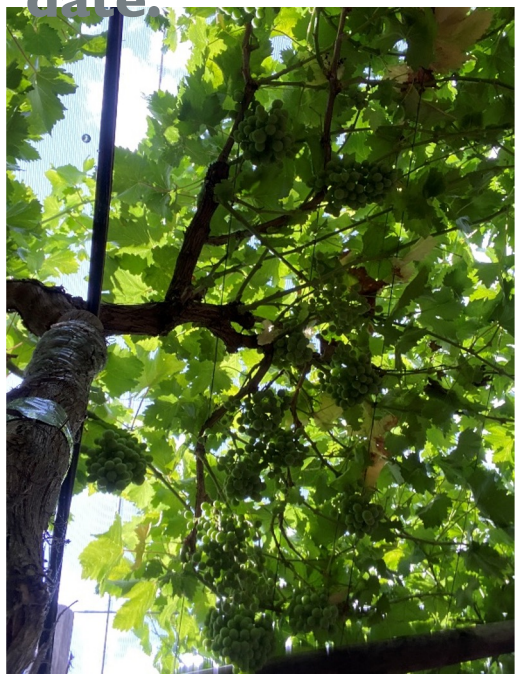
Bunches selection criteria;

2 bunches per plant per each variety at each harvest date were selected & marked, at each event. Also, 3 berries at top, middle and bottom level of each bunch were selected and marked.

2. Methodology.

Field measurement process;

Plant structures (trunk, arms, canes & shoots) measurements was collected at each date.




2. Methodology.

2 bunches per plant per each variety were harvested and marked berries at each bunch level were separated from the bunch and transported into plastic bag to avoid lose them during the trip from the farm to laboratory.

2. Methodology.

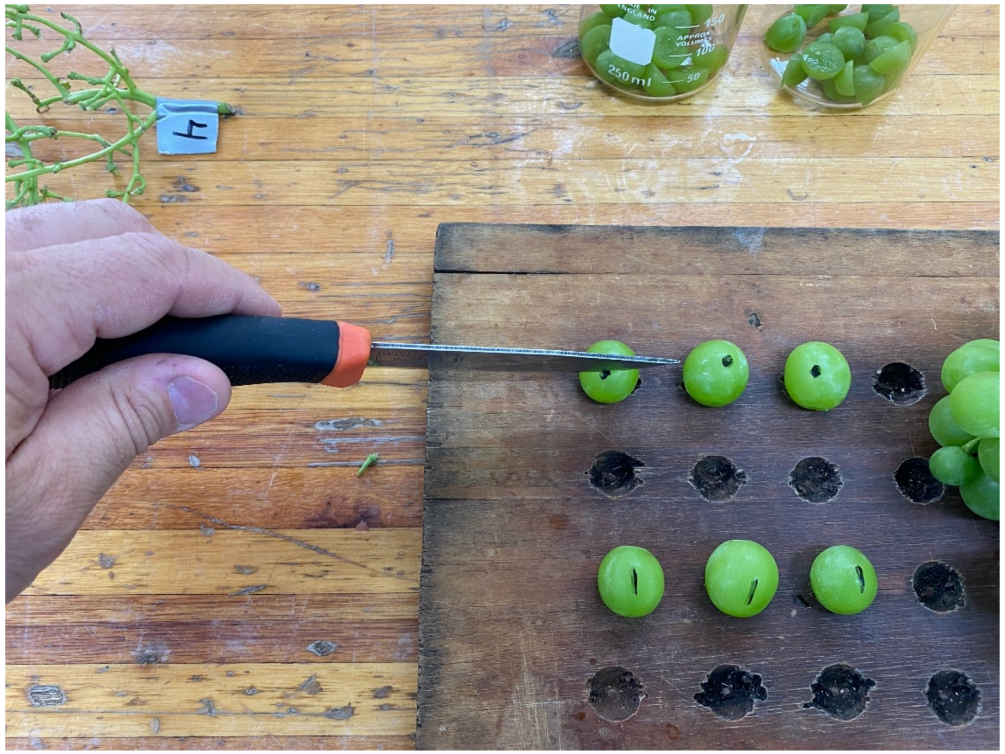
Measurements at laboratory.

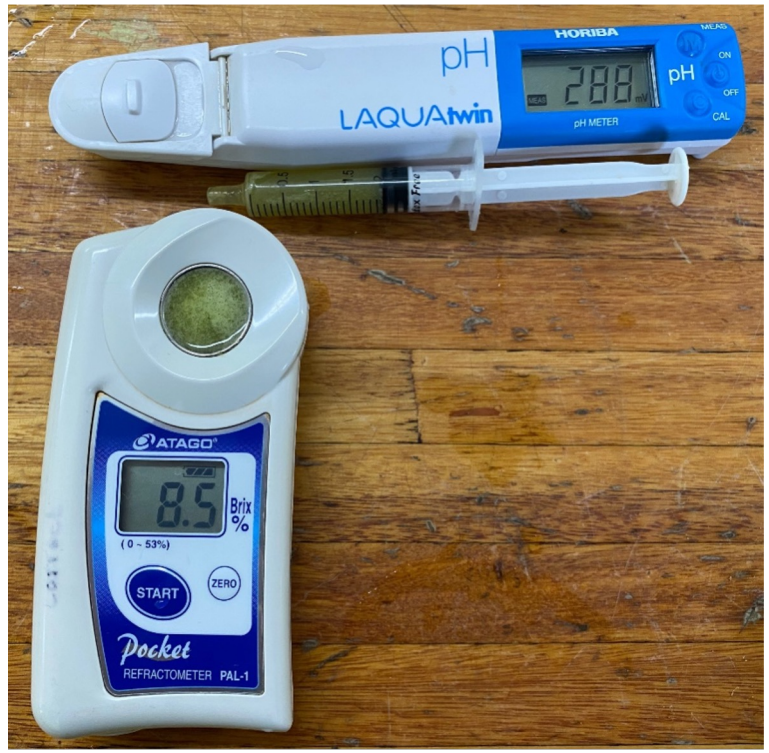
2. Methodology.

Measurements at laboratory.

2. Methodology.

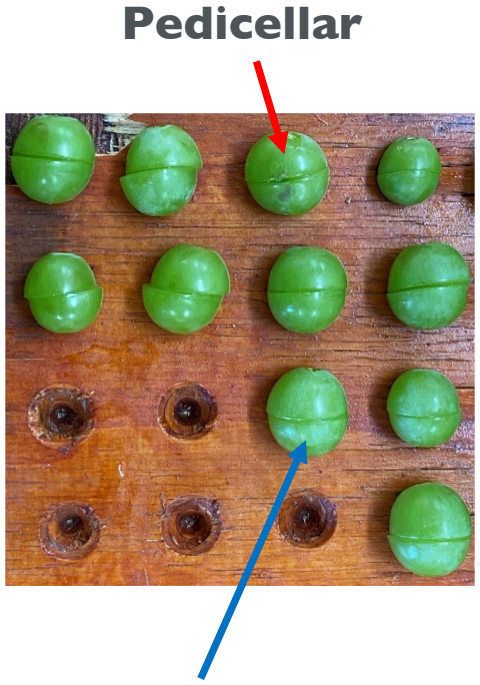
Sample preparation for Brix & pH.





2. Methodology.

Bunches preparation for measurements at top and bottom, of each bunch at distal and pedicellar.

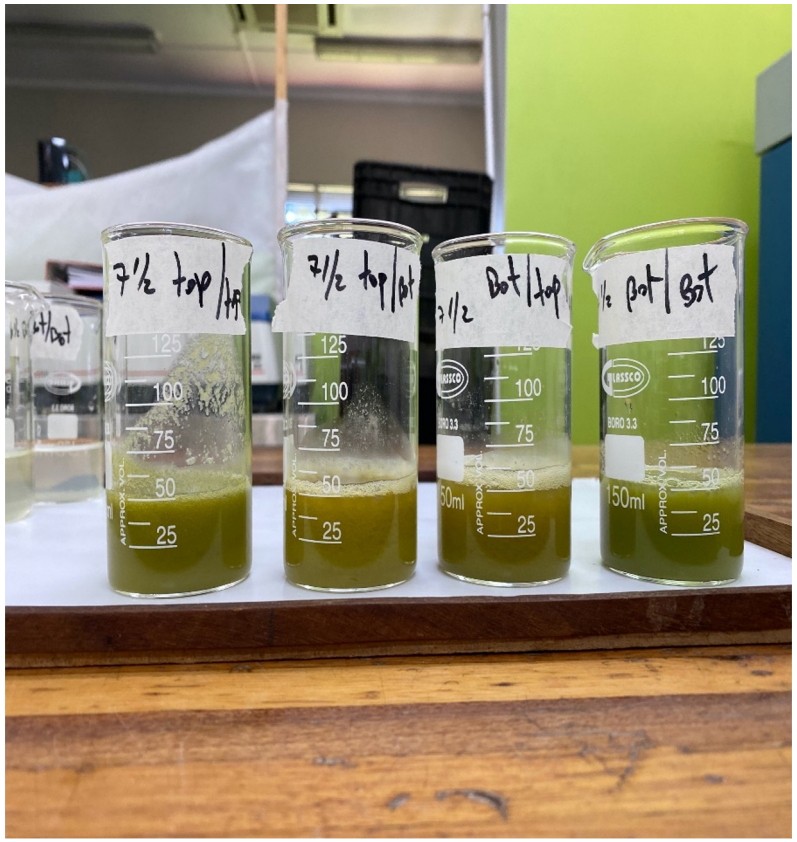


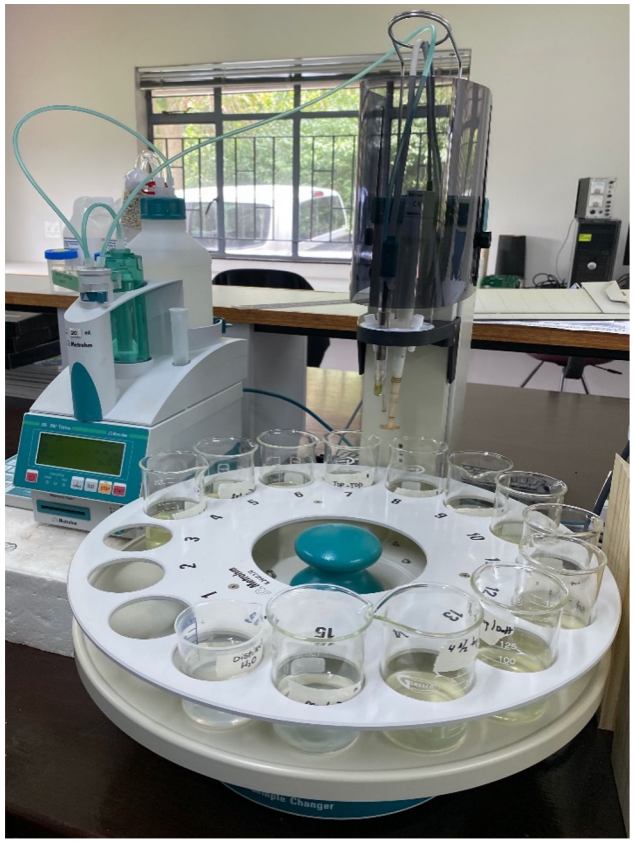
Pedicellar

Distal

2. Methodology.

Half bunches sample preparations for pH and TA measurements.





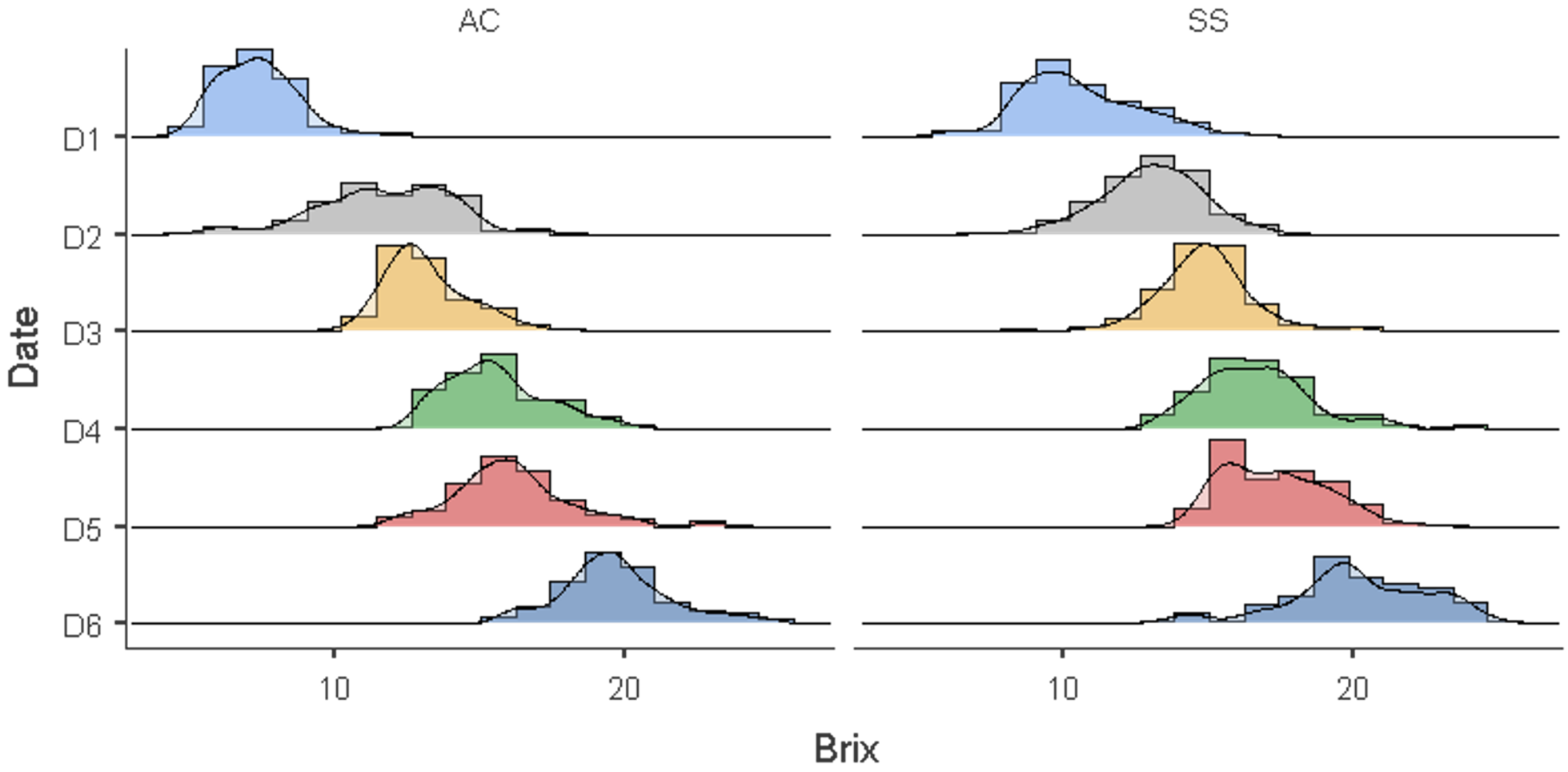
3. Results.

Sugar descriptive statistical results per date and cultivar

Cultivar	Date	N	Mean	Median	SD	Variance	Range	Minimum	Maximum
AC	D1	162	7.3006	7.3000	1.3132	1.7244	7.3000	4.7000	12.000
	D2	162	11.7009	11.8000	2.2859	5.2254	11.9000	5.4000	17.300
	D3	162	13.1458	12.8500	1.4979	2.2436	9.7500	8.5500	18.300
	D4	162	15.5651	15.3000	1.7335	3.0050	7.9500	12.5000	20.450
	D5	162	16.1015	15.9500	2.0535	4.2171	11.4500	12.0000	23.450
	D6	162	19.7112	19.5750	1.9333	3.7378	9.4500	15.7000	25.150
SS	D1	162	10.5318	10.1750	2.0565	4.2293	10.8500	5.9500	16.800
	D2	162	13.0271	13.1250	1.7135	2.9359	9.2500	7.7500	17.000
	D3	162	14.8772	14.8250	1.6771	2.8127	11.8500	8.4000	20.250
	D4	162	16.6828	16.5000	1.9529	3.8140	10.6000	13.0500	23.650
	D5	162	17.2886	17.2000	1.7832	3.1798	8.9000	14.0000	22.900
	D6	162	20.0938	20.0000	2.5271	6.3865	12.1000	13.0000	25.100

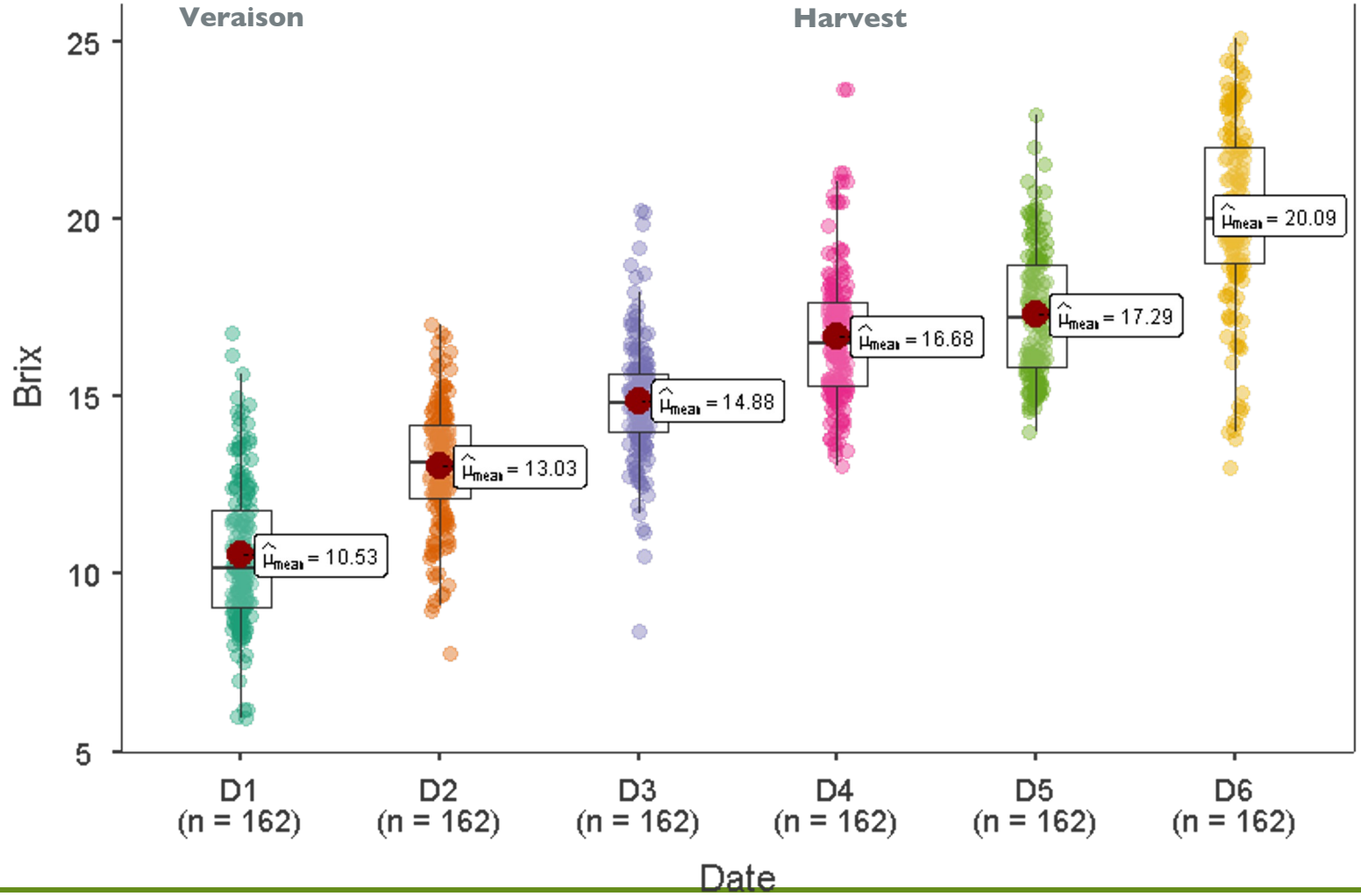
3. Results.

Sugar variability progress per date and cultivar



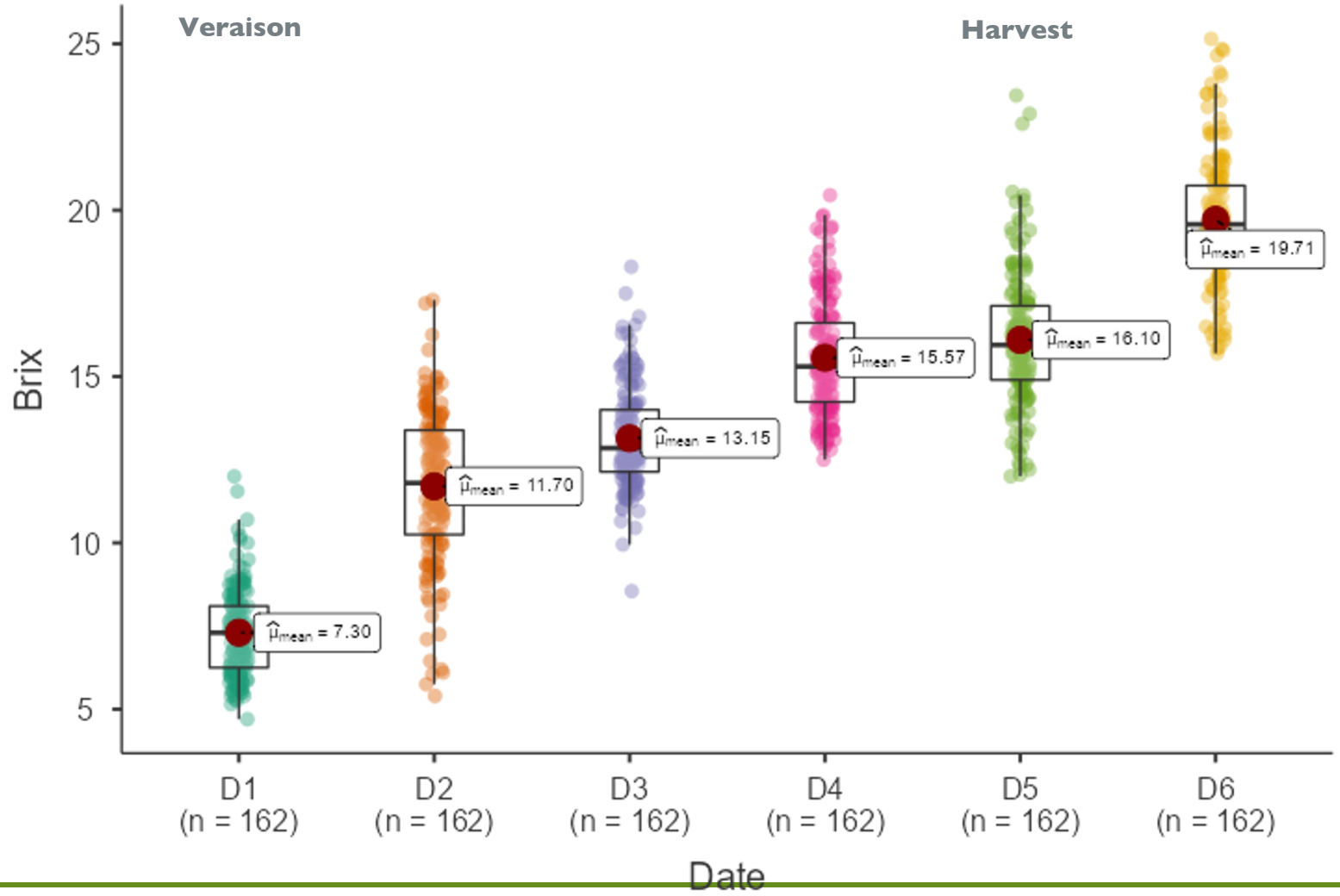
3. Results.

Sugar variability distribution witting bunches in all plants per each harvest date in Sweet Sapphire® cultivar.



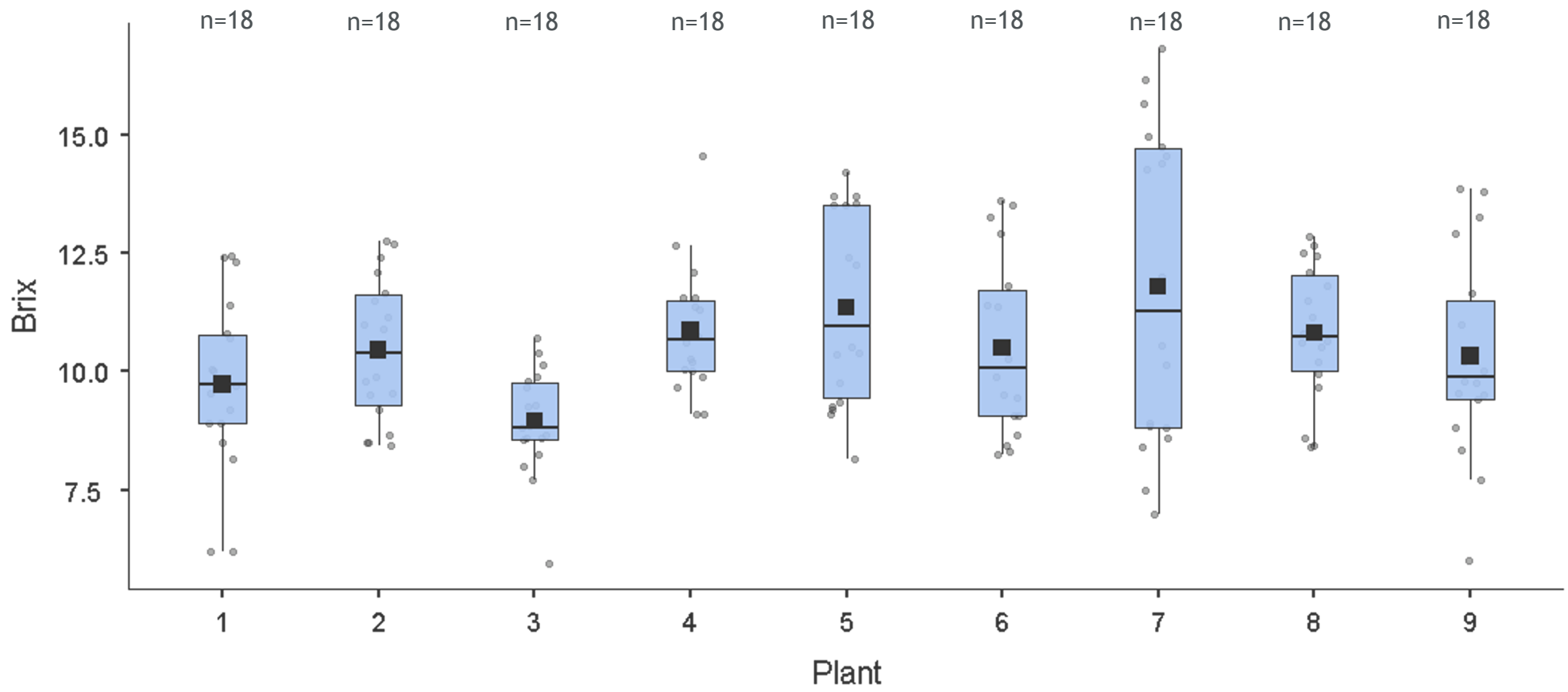
3. Results.

Sugar variability distribution witting bunches in all plants per each harvest date in Autumn Crisp® cultivar.



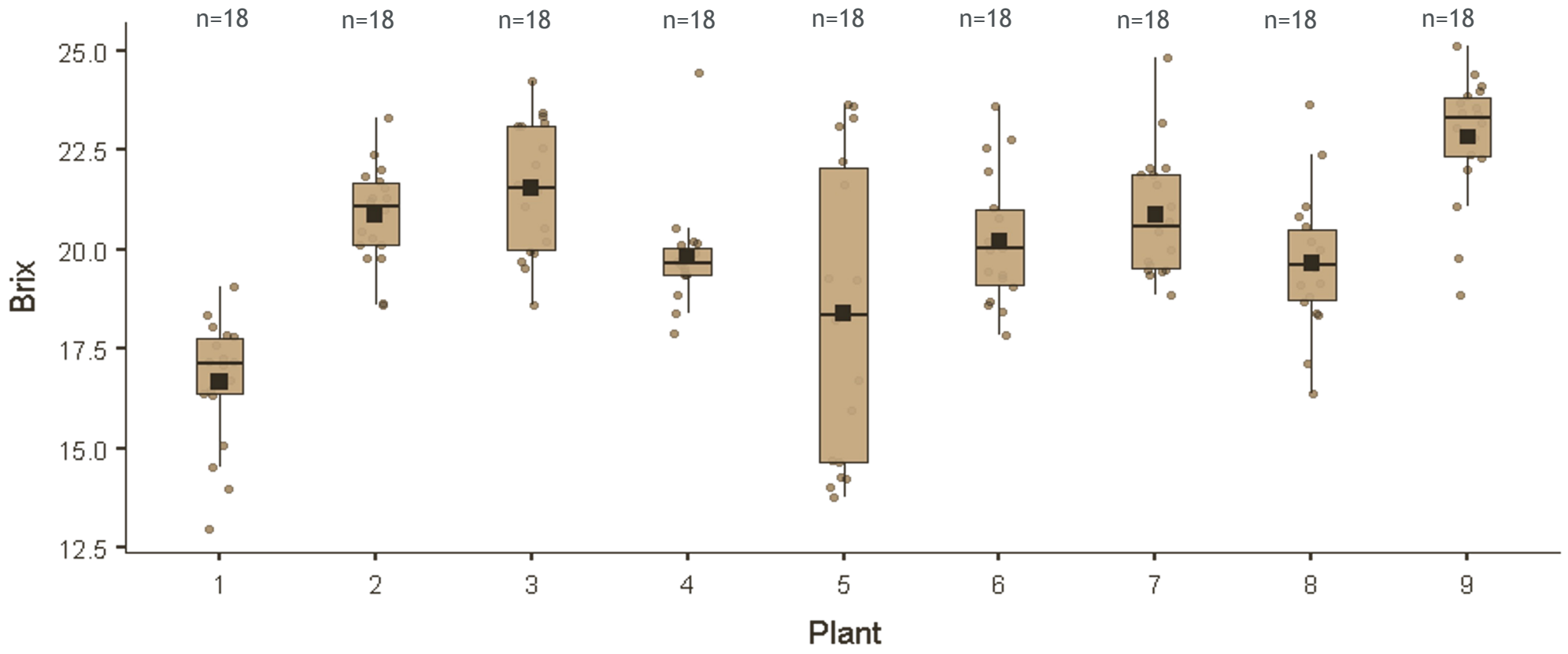
3. Results.

Sugar variability distribution witting bunches per plant in Sweet Sapphire® cultivar at Date harvest 1.



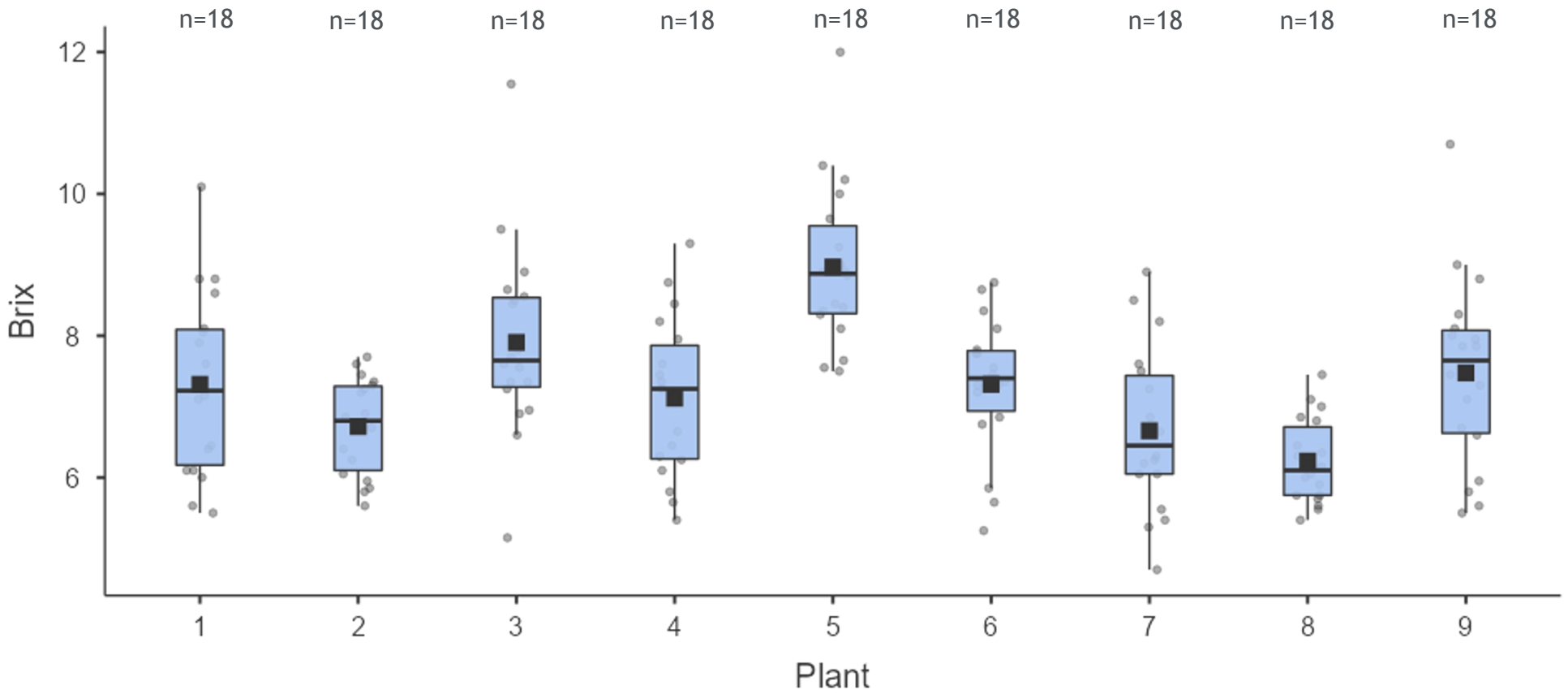
3. Results.

Sugar variability distribution witting bunches per plant in Sweet Sapphire® cultivar at Date harvest 6.



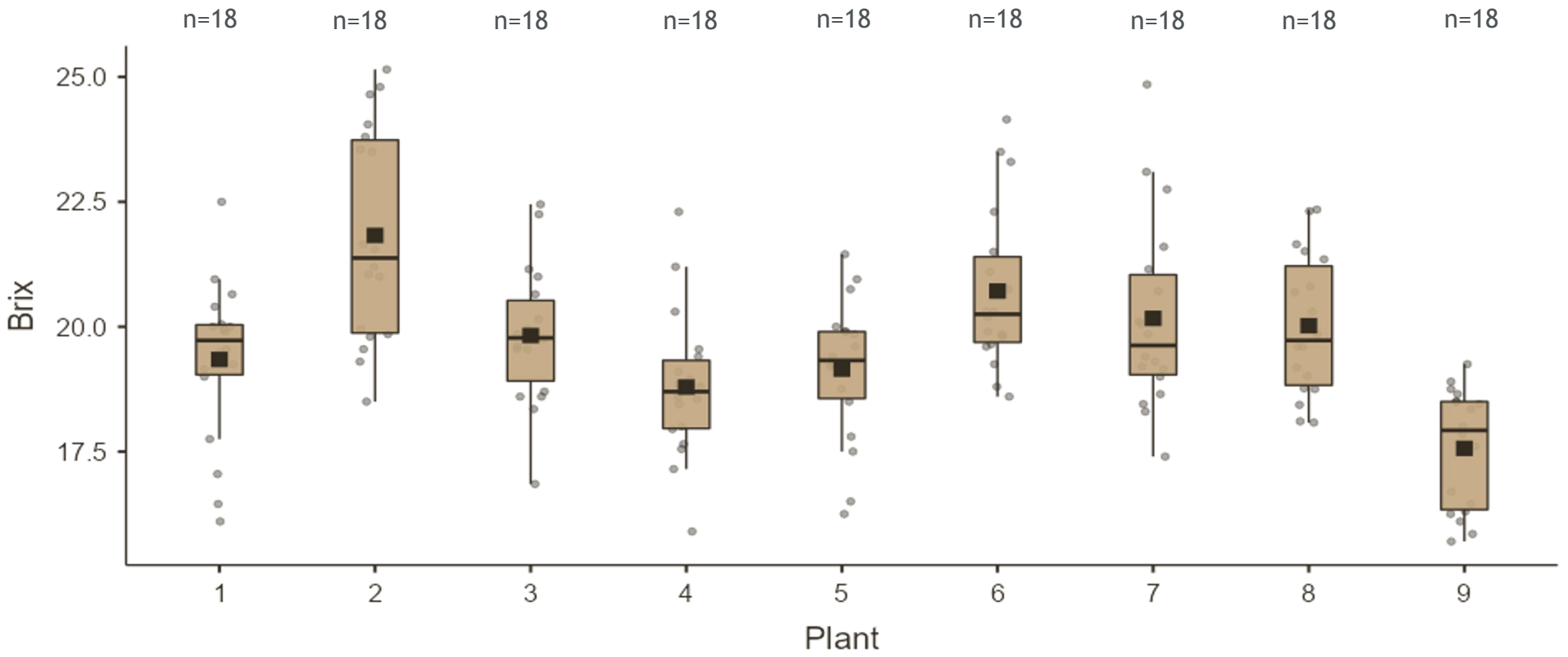
3. Results.

Sugar variability distribution witting bunches per plant in Autumn Crisp® cultivar at Date harvest 1.



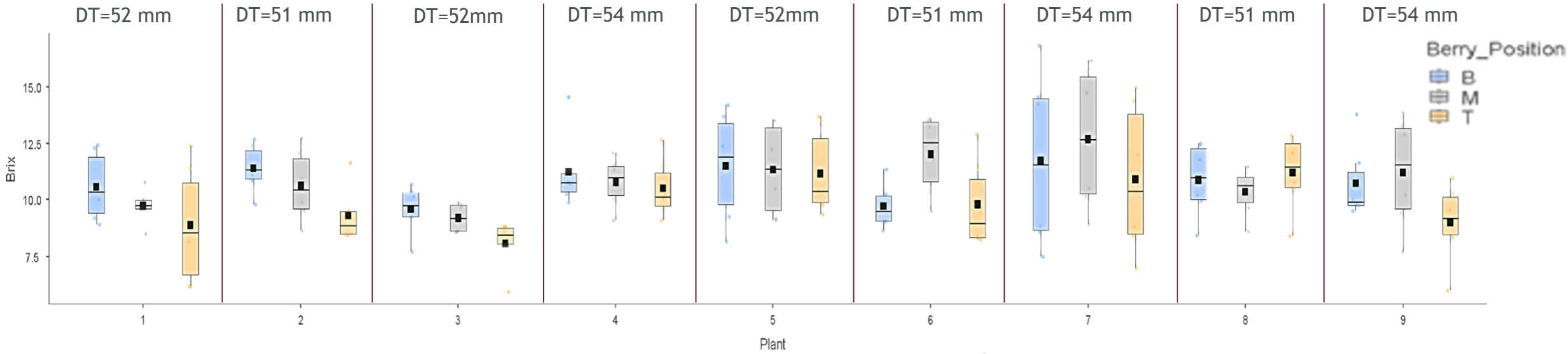
3. Results.

Sugar variability distribution witting bunches per plant in Autumn Crisp® cultivar at Date harvest 6.

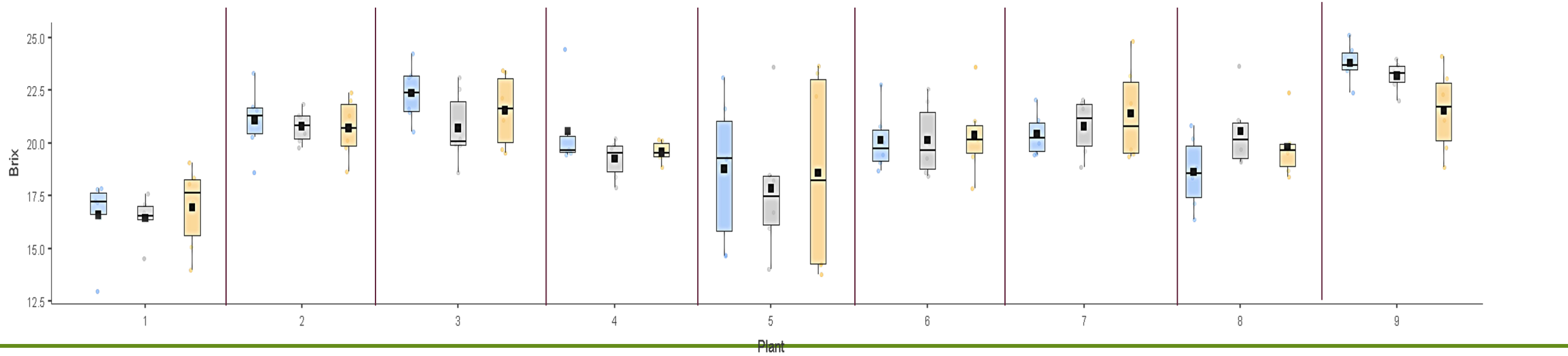


3. Results.

Sugar variability distribution per plant and berry position witting bunches per plant in Sweet Sapphire® cultivar at Date harvest 1.

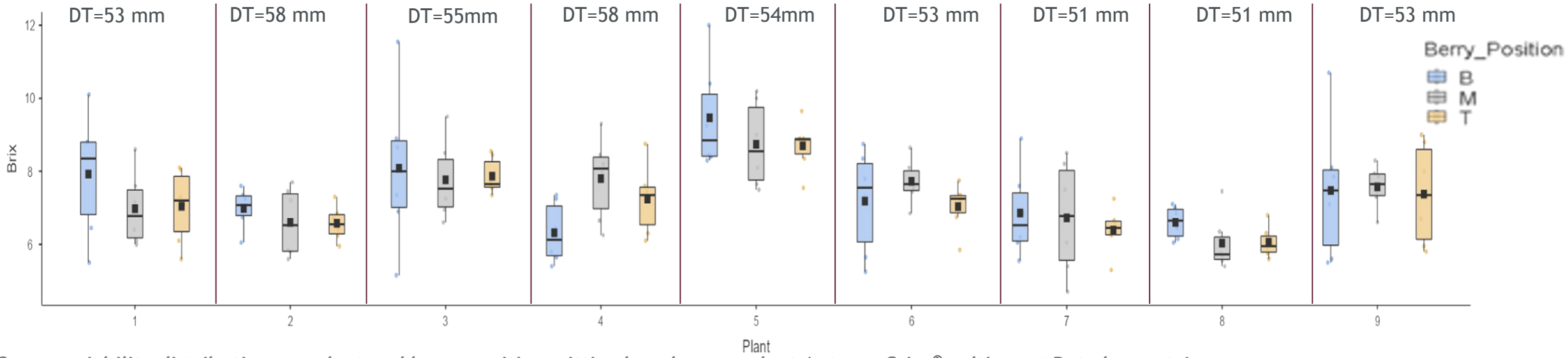


Sugar variability distribution per plant and berry position witting bunches per plant in Sweet Sapphire® cultivar at Date harvest 6.

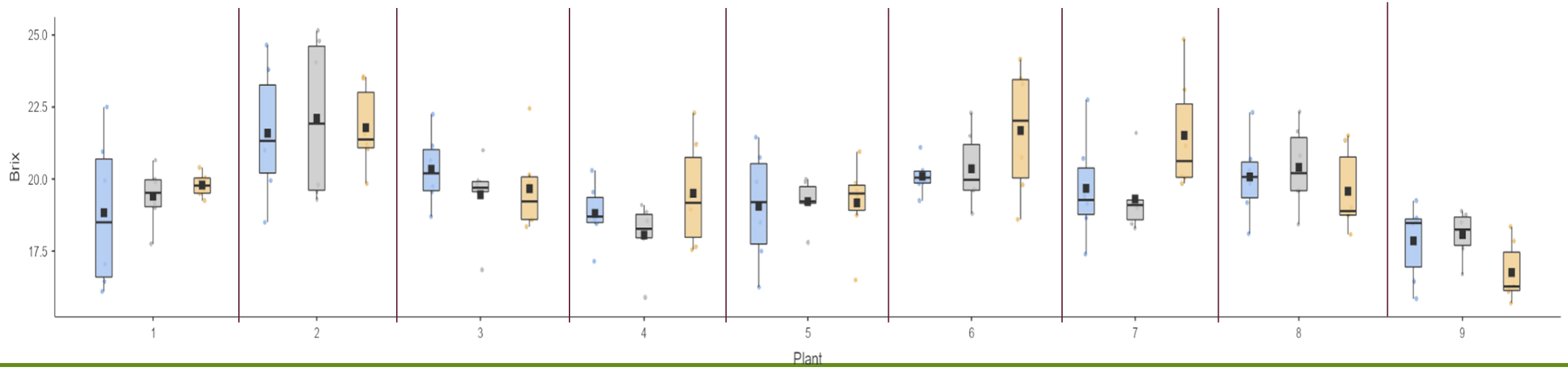


3. Results.

Sugar variability distribution per plant and berry position witting bunches per plant in Autumn Crisp® cultivar at Date harvest 1.



Sugar variability distribution per plant and berry position witting bunches per plant Autumn Crips® cultivar at Date harvest 6.



3. Conclusion.

Correlation matrix for variables of Autumn Crisp®

Correlation matrix for variables of Sweet Sapphire®

4. Final remarks

- There is high variability of Brix along all factors measured (plant, dates and berry position witting bunch).
- Autumn crisp cultivar show the smaller range of brix from both cultivars analysed at each date. With an average Brix range of 9.63 and Sweet Sapphire cultivar with an average Brix range of 10.59 Brix considering all harvest dates.
- The Brix variability witting plants for Sweet Sapphire cultivar tends to reduce at harvest 6.
- There is not a clear Brix variability at berry level witting the bunches and plants for both cultivars.
- Both cultivar shows an important berry brix asynchrony at each harvest date.
- For both cultivar there is a significant negative correlation between size, length and weight of berries with Brix. Observing slightly higher negative correlation in Sweet Sapphire cultivar.
- Brix is positive correlated to trunk and shoot diameter and negative correlated with arm and cane diameter.

5. Acknowledgments

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- Dr Janine Collins.
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- Best Team “My Family” Mrs Cecilia Gonzalez & Miss Constanza “Cotty” Oliva.

Thank you for your attention

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Photo by Stefan Els