International Cool Climate Wine Symposium (ICCWS)
& WineGB Yield Survey 2018

ICCWS- WineGB Yield Survey 2018 – Summary

The 2018 ICCWS-WineGB Yield Survey set out to show why 'grape yields in England and Wales can be significantly lower than comparable wine-producing regions and are also subject to significant temporal and spatial variation'. The 2018 survey has made a start on this quest, but the following should be taken into account when reading this report:

- Conditions in UK vineyards in both 2017 and 2018 were exceptional. 2017 saw widespread frost in many vineyards which lowered yields and quite possibly had a negative effect upon future cropping in those vineyards that were frosted. 2018 saw a combination of positive factors which resulted in an early year, a very ripe year and a year with massive yields. Therefore, it was far from a 'typical' or 'average' year and the survey results must be read with this in mind.
- Although the response of growers was felt to be good with some 20 per cent of cropping vineyards contributing, a larger sample must be the aim for future surveys in order to get better data about varieties and regions and data less prone to influence by outliers.
- Given that the two most important factors cited by growers in 'reasons for crop loss' were both fungal diseases – *Botrytis* and *Oidium* – it is obvious that disease control is one of the major factors in yield reduction for some growers. In good vineyards, those in the top quartile who manage to harvest yields almost double the UK average, one can assume perfect disease control. Disease affects not only the current crop, but also cropping levels in future years.
- The collection of data, its analysis and dissemination, has been sadly lacking over the more than half-century that the UK has had a commercial vineyard industry. It is the hope of the people involved with this report that the value of data collection will be seen to be positive and will encourage more growers to contribute in the future.
- Ongoing data collection and greater response rates would allow more effective analysis and better understanding of longer-term development of the industry thereby benefitting everyone involved with industry planning, business operational planning, winery logistics, market development and promotion.

ICCWS- WineGB Yield Survey 2018

The ICCWS-WineGB Yield Survey, undertaken in January-March 2019, was funded with part of the ICCWS surplus with some additional funding from WineGB. The project was undertaken by Jim Newsome of Veni Vidi Viti Ltd, in conjunction with Australian viticulturalist and past WineSkills Mentor, Peter Hayes AM, with advice and input from Stephen Skelton MW, Chair of the WineGB Viticultural Working Group. The data was collected and analysed independently, and completely anonymously, by Wine Intelligence Ltd. This report has been written by Stephen Skelton MW, with input from Jim Newsome and Peter Hayes AM.

When reading this survey, it must be remembered that 2018 was a very exceptional year for UK vineyards. With perfect pre- and post-flowering conditions and a good summer with both heat and rainfall, an early harvest saw many production figures broken. Yields and sugar levels were well above normal and growers had the luxury of time to let their grapes ripen. Whilst much good data was produced by the survey, it was drawn from a very non-average year. The survey can of course only record and reflect the vintage and therefore some technical management notes (at the end of this report) are included to suggest possible explanations for the currently reported performance data.

(Also see Appendix 1: Harvest Report - 2018 for more details on the weather during the year.)

A total of 114 vineyards supplied data whose combined vineyard area covered 464-ha (1,147-acres), around 20 per cent of UK vineyards that were cropping in 2018. Respondents replied where possible with data separated into 'parcels' i.e. an identifiable piece of vineyard planted with one variety-clone-rootstock combination and the data was analysed on that basis. Some of the data had to be discounted where it risked identifying individual vineyards and/or parcels and some data had to be ignored where there appeared to be confusion between (for instance) hectares and acres and/or kilos and tonnes. One of the problems of analysing the data, especially where parcel numbers were small, is that outliers can skew the results and there is no doubt that some of the results need to be viewed with this factor taken into account. In order to make the data more reliable, the data used was taken from vineyards of 0.10-ha or more[a] and at least in their fourth year i.e. could be considered under normal circumstances to be fully cropping. This reduced the number of vineyards down to 90 and the area surveyed to 401-ha (991-acres).

Vineyards were fairly well spread across the country, with growers in East Sussex, Hampshire, Kent, Devon, Dorset, Wiltshire, Northamptonshire, Surrey and West Sussex (in that order) supplying the largest area of returns, but with twenty-five more counties in both England and Wales supplying data. Varieties grown covered the spectrum of varieties being grown with enough data from eleven varieties for them to be separately analysed, with additional data from twenty-four other varieties also being recorded. This covered all of the major and significant minor varieties which together account for 95 per cent of UK vineyards. 64 per cent of all vineyards said they were south facing, 14 per cent, south east, and 12 per cent south west. The balance of 10 per cent owned up to being facing in other directions, or 'don't know'. It would have been good to analyse results based upon vineyard orientation, but this was not possible due to budgetary constraints. Almost all soil types were covered with vineyards on 'shallow lime-rich soils over chalk or limestone' being in first place, and 'slowly permeable seasonally wet slightly acidic' in second place. In the top 6 categories of soil type, 4 are described as 'slowly permeable seasonally wet'. Only around 20 per cent of vineyards were drained. Again, results based upon drainage might have been interesting.

[a] This is the size which the Wine Standards Branch considers 'commercial' and which in theory must register within 6 months of planting.

Yields

The average yield of all 90 vineyards was 7.12 t-ha (2.88 t-acre) which, taking a pressing percentage of 70 per cent[b] (7 hl-tonne), equates to 48.84 hl-ha. For 2018, the WSB has reported a national yield of 98,289-hl (13.11 million 75 cl bottles), just over twice as large as the previous largest harvest (2014 – 48,267 hl). Average yield per hectare is not known at this stage (as the WSB appears not to have the figures to hand) but an educated guess puts the national yield at around 45 hl-ha, almost double the previous 5-year (2013-17) average of 24.32 hl-ha, although only 20 per cent higher than the previous highest yield per hectare which was 27 vintages ago in 1992 when it was 37.7 hl-ha. The current national 5-year average yield (2014-18) is now 28.47 hl-ha (which is still only around 4 tonnes-ha or 1.65 tonnes-acre). The WSB's figures of course include vineyards under four years old which accounts for the yield difference between their national figures and the ICCWS Yield Survey's[i].

Vineyards 0.10 ha or larger. At least 4 years old	No. of Vineyards	Hectares	Average Size	Total yield tonnes	Average Yield T-ha
All vineyards	90	401	4.46	2,855	**7.12**
Top yielding 25% of vineyards	22	111	5.05	1,168	**10.52**
Middle yielding 50% of vineyards	45	266	5.91	1,638	**6.16**
Bottom yielding 25% of vineyards	23	24	1.04	39	**1.63**

If the yield from the 90 vineyards is split by yield per hectare into quartiles, then as seen from the table above, the top 25 per cent of vineyards by yield averaged 10.52 t-ha (4.26 t-acre), a figure which is well above break-even, but for many producers is at least 50 per cent higher than their normal yields. The middle 50 per cent who represent what one might term 'average' growers have a yield of 6.16 t-ha (2.49 t-acre) which is barely break-even and cannot be enough to maintain a viable and sustainable business. The last 25 per cent are producing yields which would indicate they are struggling commercially as viable vineyards.

Yields compared to previous yields

Taking data derived from my previous harvest reports which in 2016 covered 31 producers and 547-ha, and in 2017 covered 79 producers and 516-ha, the comparisons in the table below can be made. It must be remembered that 2017 was a frost-affected year and yields varied widely for some varieties and growers.

For the top 25 per cent of vineyards, yields in 2018 were higher, but only by 14 per cent over the average for the previous two years. This shows that these vineyards can achieve sensible yields year-in and year-out, barring really disastrous years such as 2012. For vineyards in the middle 50 per cent, 2018 saw yields 44 per cent higher than their 2016-17 averages, showing that their sites need an exceptional year just to break-even. Of course, the break-even point for any business is comprised of a multiple of factors, but in UK vineyards just

[b] 70 per cent is an educated guess and takes into account both still and sparkling wine producers. Still wine producers might achieve nearer 75 per cent, depending on pressing practices, whereas some sparkling wine producers only produce between 500 and 650 litres per tonne (50-65 per cent) although many will press out the remainder of the juice for use in still wines or other products.

selling grapes, around 4.5 to 5.0 t-ha is required to cover annual outgoings, to say nothing of a contribution towards the capital invested in land and vineyards.

Yields Tonnes-ha	2016	2017	2018	Average 2016-18
Top 25% of vineyards - all varieties	8.84	9.57	10.52	9.64
Middle 50% of vineyards - all varieties	4.41	4.12	6.16	4.90
Bottom 25% of vineyards - all varieties	1.36	1.31	1.63	1.43
All Champagne varieties	4.49	4.55	8.71	5.92
All non-Champagne varieties	4.57	4.82	8.35	5.91
All varieties	**4.54**	**4.68**	**7.12**	**5.45**

Yields by region[d]

Owing to a lack of data about many varieties for every region, it was only possible to investigate data for two varieties individually and for four regions. However, these are the two largest varieties by far, Chardonnay and Pinot Noir, which together probably now account for over 60 per cent of all plantings, and for four regions, East Anglia, the South East, Wessex and the South West, which together account for over 90 per cent of all UK vineyards. It should be pointed out that the sample sizes for the South West and East Anglia were low and therefore less reliable than for the other regions.

The table below shows that the South East occupied the top spot with yields of 9.99 tonnes-ha (4.04 t-acre) for Chardonnay and 8.99 tonnes-ha (3.64 t-acre) for Pinot noir. Next was Wessex with slightly lower yields (7 per cent lower), followed by East Anglia (33 per cent lower) and the South West (62 per cent lower). These figures emphasise that in 2018 the south-eastern half of England has a significant advantage in terms of yield over the more westerly and easterly parts of the country. Undoubtedly wind and rainfall are factors in these yield differences.

Median by variety by region Tonnes-ha	East Anglia	South East	Wessex	South West
Chardonnay	6.79	9.99	9.45	2.75
Pinot Noir	5.93	8.99	8.16	4.46
Average Yields	**6.36**	**9.49**	**8.80**	**3.60**

There was enough reliable data for Seyval blanc in three regions, and 'other varieties' in all regions for some useful observations. The table below shows that Seyval blanc is capable of producing good yields in the wetter and windier parts of the UK, with yields in the South West for this variety three times larger than for Chardonnay.

[d] Regions are as defined by regional vineyard associations.

Median by variety by region Tonnes-ha	East Anglia	South East	Wessex	South West	Other regions
Seyval Blanc	n/a	n/a	12.23	8.23	14.24
Other varieties	6.41	8.50	7.10	6.10	7.20
Average Yields	**6.38**	**8.50**	**9.24**	**5.38**	**9.49**

Yields by variety[e]

Yields of individual varieties varied between Reichensteiner at 16.60 t-ha (6.72 t-acre), down to 4.10 t-ha (1.66 t-acre) for 'other varieties' (see list). The Champagne varieties, Chardonnay, Pinot noir and Meunier, were the varieties with the greatest number of recorded parcels – and can thus be considered the most representative and potentially valid representation of UK yield performance. – and these three recorded reasonable yields ranging from Meunier with 9.53 t-ha (3.86 t-acre) down to Pinot Noir with 7.93 t-ha (3.21 t-acre). The good performance of Meunier was no doubt due to the very large bunches that many growers saw. If Reichensteiner is removed from the figures, the median yield across all other varieties falls to 7.70 t-ha (3.12 t-acre). Bacchus, the UK's most widely grown still wine variety, fared badly with a yield of only 5.48 t-ha (2.22 t-acre). Whether this is an accurate reflection of all Bacchus growers is another matter and it may be that the data included a disproportional number of young or poorly performing vineyards. The relatively poor performance of Pinot noir (compared to Chardonnay and Meunier) might be influenced by losses due to *Botrytis*, the biggest factor in crop loss cited by growers in this survey.

Variety	Number of parcels	Median yield t-ha	Median yield t-acre
Reichensteiner	5	16.60	6.72
Regent	7	11.09	4.49
Meunier	16	9.53	3.86
Seyval Blanc	14	9.38	3.79
Chardonnay	28	8.67	3.51
Pinot Noir	32	7.93	3.21
Pinot Blanc	5	7.85	3.18
Rondo	15	7.30	2.95
Madeleine x Angevine	8	6.70	2.71
Pinot Noir Précoce	9	6.62	2.68
Bacchus	16	5.48	2.22
Other varieties*	26	4.10	1.66

[e] Median was chosen over average in many cases in an attempt to reduce the influence of outliers in the data.

Varieties included in "Other varieties"		
Acolon		Ortega
Dornfelder		Phoenix
Findling		Pinot Gris
Huxelrebe		Schönburger
Kerner		Siegerrebe
Optina		Solaris
Orion		Triomphe

Yields by variety 2016-18

Taking data derived from my 2016 and 2017 harvest reports, I have been able to track the yield by variety of most of the major[f] varieties (which together accounted for 85.6 per cent of the UK's planted vineyard area) for the last three years. Star performers are Regent, Reichensteiner and Rondo (two of which are interspecific crosses), all with yields of more than 8 tonnes-ha (3.2 t-acre) which, given that 2017 was a frost year, says something. Top performer Reichensteiner was driven upwards by an amazing 2018 harvest, although having grown this variety since I started growing vines in 1977, I am not surprised as it has always performed well. Wine quality can be good and it makes a perfect blending partner for other, more aromatic varieties. Most of the other major varieties are clustered around the 6.0-7.0 t-ha (2.4-2.8 t-acre) mark which is where you would expect them to be. The top 25 per cent vineyards will be beating these figures by at least 30 per cent. There are two slight anomalies: Bacchus and Seyval blanc. The 2016 figures for Bacchus are taken from only 9 entries, 2 of which are very low, probably due to poor flowering or maybe *Botrytis*. If these are removed, the average rises to 4.00 t-ha, itself not large, but nevertheless, an improvement. The 2017 Bacchus figures include frosted vineyards and if these are removed, the yield rises to 5.55 t-ha. If both the 2016 and 2017 revised yields are used, the 2016-18 average rises to 5.01 t-ha (2.02 t-acre) not in itself high, but at least better.

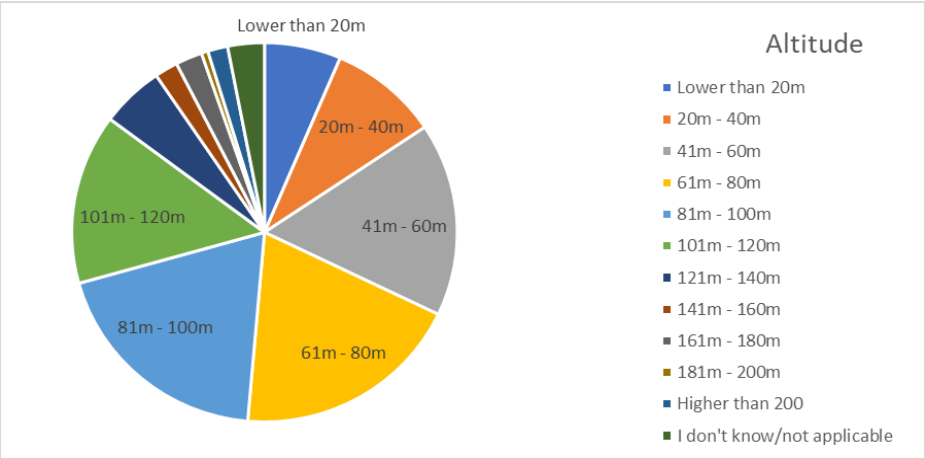
The performance of Seyval blanc at 6.94 t-ha (2.81 t-acre) is also on the low side, compared to levels that good growers achieve with this variety. 2016 figures only came from 6 sources and if you take the top 50 per cent, the average is 6.40 t-ha. For 2017, taken from 19 sources, the top 50 per cent average 11.24 t-ha. Taking these figures, the 2016-18 average rises to 9.01 t-ha (3.65 t-acre), a much more respectable figure. The fact that Seyval blanc is now not so widely grown in the major vineyard regions as it used to be and is more likely to be found in the less favourable westerly and northern regions, probably accounts in some part for the lower average yields.

[f] See Appendix II: UK Vine Varieties 2018

Yields Tonnes-ha	2016	2017	2018	Average 2016-18	Av. 2016-18 t-acre
Bacchus	3.07	4.21	5.48	4.25	1.72
Chardonnay	5.58	4.42	8.67	6.22	2.52
Madeleine x Angevine 7672	6.05	5.64	6.70	6.13	2.48
Meunier	5.88	5.24	9.53	6.88	2.79
Pinot Blanc	No data	4.86	7.85	6.36	2.57
Pinot noir	3.00	4.31	7.93	5.08	2.06
Pinot Noir Précoce	1.81	3.50	6.62	3.98	1.61
Regent	No data	5.70	11.09	8.40	3.40
Reichensteiner	8.36	4.37	16.60	9.78	3.96
Rondo	No data	9.24	7.30	8.27	3.35
Seyval blanc	4.58	6.87	9.38	6.94	2.81
Other varieties*	4.26	3.68	4.10	4.01	1.62
Average all varieties listed	**4.73**	**5.17**	**8.44**	**6.36**	**2.57**

Altitude and yield

The commonly held view is that the higher above sea level vines are grown, the cooler it is and therefore the lower the yields will be.[ii] The data collected however, shows that at least in 2018, this was not the case. Both average and median data show that vineyards between 41 m and 60 m above sea level had yields that were the lowest of all altitude bands recorded. If you show the data in a slightly different format (next table), it shows that the 'sweet spot' (as far as altitude is concerned) lies between 61 and 100 m above sea level. These results may well have as much to do with the peculiarities of the 2018 vintage which, being plentiful and early, meant that elevated sites, which might struggle in later, less benign years, were able to produce higher yields which were successfully ripened. Data from more challenging years is needed to see what real difference altitude makes. As can be seen by the pie chart below, over half of all recorded vineyards were below 80 m above sea level, with another 30 per cent or so between 81 m and 100 m above sea level.



Altitude and yield	Number of parcels	Average yield t-ha	Median yield t-ha
Lower than 20m	15	8.56	6.06
20m - 40m	15	7.93	6.67
41m - 60m	38	6.00	4.95
61m - 80m	36	9.79	7.18
81m - 100m	34	9.59	8.68
101m - 120m	23	9.40	8.23
Higher than 121m	14	8.32	9.00

Altitude & yield recoded	Count of parcels	Average yield t-ha	Median yield t-ha
Lower than 60m	68	7.00	5.73
61m-100m	70	9.69	8.33
Higher than 100m	37	8.99	8.40

Yield and vine density

Yield returns based upon vine density showed quite markedly the effect of vine numbers per hectare upon yield. Taking average and median yields together, densities of 3,001 vines-ha and more recorded yields of 10.05 t-ha (4.07 t-acre) whereas vineyards with densities of 3,000 vines-ha or fewer recorded yields of 5.32 t-ha (2.15 t-acre) – almost half as much. At the bottom end, vineyards with less than 2,000 vines-ha only had a median yield of 3.00 t-ha (1.22 t-acre) which is well below break-even. There are lots of reasons for this, but essentially in cane-pruned systems, row width, the major factor in vine density (but of course not the only one as intervine distance also plays a part, but a lesser one) fixes the bud numbers. The narrower the rows, the higher the number of buds per hectare as overall cane length increases. In addition, the more vines per hectare, the less access to water each vine has (as rainfall doesn't discriminate between high- and low-density vineyards), thus aiding vigour control and the less crop per vine (for the same level of yield), the easier an individual vine can both set a crop and ripen it. Vines planted at high density also probably have better post-harvest reserves as they have had less crop to ripen and it is suggested (although more data is needed on this) that they crop earlier, thus allowing for more post-harvest catch-up.[v]

Density of vines per ha	Number of parcels	Average yield t-ha	Median yield t-ha
Less than 2,000 vines per ha	23	4.69	3.00
2,000-3,000 vines per ha	55	7.39	6.20
3,001-4,000 vines per ha	55	10.03	9.19
More than 4,000 vines per ha	42	10.97	10.00

Yield and row width

Row width of course, given the same intervine planting distance, is a key factor in vine density, so it is not surprising that the data shows that as row width increases, yield falls. The one anomaly is the 'Below 2.00 m' figure which appears to show the opposite and this requires further investigation into the underlying data for an explanation.[vii] However, with this

exception, the data shows that as row width increases, yields fall. Over 2.60 m, the yields fall dramatically. The sweet-spot appears to be 2.00-2.10 m. Around 18 per cent of respondents planted at 2.00 m, another 18 per cent at 2.20 m and 8 per cent at 2.40 m.

Yield and row width	Count of parcels	Average yield t-ha	Median yield t-ha
Below 2.0m	21	5.87	5.40
2.0m - 2.1m	48	10.31	10.00
2.2m - 2.3m	45	9.56	8.40
2.4m - 2.5m	40	8.20	7.89
Over 2.6m	27	6.51	5.75

Sugar – by variety

With the exception of Rondo and Seyval blanc, all varieties recorded a sugar level at picking of over 73˚ÖE (9.70% potential alcohol) showing what an unusual year 2018 was. Quite why Rondo was so low, given that it was only cropping at 7.30 t-ha, is a mystery. The data also shows how Reichensteiner, which cropped at 16.60 t-ha (6.72 t-acre) is a very sugar-productive variety and managed to ripen a large crop of grapes to an average of 77.5˚Öe.

Varietiy	Count of parcels	Average sugar level Degrees Oe	Median sugar level Degrees Oe
Bacchus	19	77.5	76.0
Chardonnay	30	77.8	78.0
Madeleine x Angevine	8	74.9	75.5
Meunier	16	74.6	75.0
Pinot Noir	34	78.6	78.0
Pinot Noir Précoce	10	73.9	73.5
Regent	9	75.7	78.0
Reichensteiner	6	77.5	75.0
Rondo	16	69.8	69.0
Seyval Blanc	13	67.6	70.0
Other varieties*	41	78.1	79.0

Sugar – by altitude

The effect of altitude on sugar levels is mixed. Three varieties, Bacchus, Chardonnay and Meunier, show a reduction in sugar level as you climb in altitude (which is what you would expect), but for Pinot noir, Rondo and Seyval blanc, the effect is opposite with sugar levels rising as you climb in altitude. Why this should be is a mystery. The results for Chardonnay, a high-acid, sometimes hard-to-ripen variety, are quite marked with a 9 ˚Oe difference between 'lower than 60 m' and 'higher than 100 m' which is a significant result. One factor which was not asked in the survey was picking date, and it maybe that vineyards at higher altitudes picked later which in 2018 made no difference (it being an early year) and growers were able to let the grapes hang to achieve the sugar levels they wanted. In more challenging

years there might well have made a more marked difference on sugar levels (as well as acidity levels) as you rise in altitude.

Median level of Sugar (°Oe) by variety by altitude	Lower than 60m	60m-100m	Higher than 100m
Bacchus	79.5	77.0	73.0
Chardonnay	84.0	78.0	75.0
Meunier	76.5	75.0	72.5
Pinot Noir	76.0	77.5	78.0
Rondo	68.0	68.0	70.0
Seyval Blanc	67.5	67.0	70.0
Other varieties	76.0	80.0	74.0
Average °Oe	**75.4**	**74.6**	**73.2**

Sugar – by density of planting

The differences in sugar levels between vineyards with 3,000 vines-ha and more and those with less than 3,000 vines-ha were mixed. Some varieties showed a slight rise in the more densely planted vineyards; others a slight fall. Again, 2018 was such an unusual year that the results need to be viewed with this in mind.

Median level of Sugar (°Oe) by variety by density	Less than 3,000 vines-ha	More than 3,000 vines-ha
Bacchus	75.0	75.5
Chardonnay	80.0	78.0
Meunier	73.0	75.0
Pinot Noir	78.0	78.0
Rondo	68.0	70.0
Seyval Blanc	67.0	65.0
Other varieties	75.0	78.0
Average	**73.7**	**74.2**

Acidity – by variety

Acidity (measured in grammes per litre as tartaric acid) showed the sort of results one would expect for a warm, early year with the no surprises. Pinot Noir Précoce showed a marked difference in acidity from Pinot noir of 3.2 g/l, something which in more marginal sites would be a distinct advantage.

Variety	Count of parcels	Average acidity level g/l tartaric	Median acidity level g/l tartaric
Bacchus	15	9.3	9.0
Chardonnay	23	11.7	12.0
Madeleine x Angevine	5	9.5	10.1
Meunier	11	11.8	11.9
Pinot Noir	25	11.8	12.0
Pinot Noir Précoce	6	8.6	8.5
Reichensteiner	4	8.8	8.8
Rondo	6	9.1	9.2
Seyval Blanc	8	11.0	11.3
Other varieties*	26	9.3	8.9

Acidity – by altitude

Acidity appears to be much more influenced by altitude than sugar level. One reason for this is probably because growers base their picking date on sugar level i.e. waiting until the sugar rises to the point where they consider the grapes ripe, at which point they harvest at whatever acidity level is there, dealing with it in the winery if needs be. With the exception of Meunier, all varieties showed that vineyards above 60 m above sea level had higher acid levels. Unfortunately, the data was not sufficient
enough to split it between say those vineyards up to 100 m above sea level and those between 100 m and 60 m.

Average acidity level (g/l) by variety and by altitude	Lower than 60m	Higher than 60 m
Bacchus	9.2	9.4
Chardonnay	11.5	12.0
Madeleine x Angevine	9.2	9.7
Meunier	11.9	11.7
Pinot Noir	11.8	11.9
Pinot Noir Précoce	8.1	9.7
Rondo	8.4	9.9
Other varieties	9.4	9.7
Average Acidity	**9.9**	**10.5**

Acidity – by density of planting

The differences in acidity between vineyards with less than 3,000 vines-ha and those with more than 3,000 vines-ha was variable. For Bacchus, Meunier, Pinot noir and Seyval blanc (all major varieties) the difference was a reduction of 0.7 g/l for the higher density plantings. Whether this is a material difference is open to debate. Again, as with sugars, acidity levels

are to a great degree in the hands of growers and/or winemakers and 2018 was a year which gave producers plenty of leeway with their 'hang-time'. A more challenging year might see a greater diversity between high- and low-density planting.

Average acidity level (g/L) by variety and by density	**Less than 3,000 vines-ha**	**More than 3,000 vines-ha**
Bacchus	9.8	9.0
Chardonnay	11.9	11.9
Meunier	12.3	11.5
Pinot Noir	12.0	11.8
Pinot Noir Précoce	n/a	8.6
Rondo	8.9	9.0
Seyval Blanc	11.1	10.1
Other varieties	9.1	9.3
Average Acidity	**10.7**	**10.1**

Crop loss

- Growers were asked were asked to rank the factors that caused some loss of crop. This is the percentage of growers that responded, not the percentage of the crop they lost:
    - 45 per cent of growers said Botrytis
    - 44 per cent of growers said Powdery Mildew
    - 40 per cent of growers said Birds
- Crop loss Other reason for loss of crop were:
    - 34 per cent Animals (deer, badgers, rabbits)
    - 19 per cent Downy Mildew
- Other reasons included:
    - 6 per cent Trunk Diseases
    - 6 per cent Early Bunch Stem Necrosis (EBSN)
    - 5 per cent Extreme weather
    - 2 per cent SWD
    - 1 per cent Black Rot

Rootstocks

Growers were asked what rootstocks they had. The answers were as follows:

- SO4 40 per cent of vines
- Don't know 12 per cent of vines
- Fercal 9 per cent of vines
- 41B 6 per cent of vines
- Own roots 5 per cent of vines
- 125 AA 2 per cent of vines
- 3309C 1 per cent of vines

- Binova, 101-14, 5BB, 5C, 161-49, Gravesac Less than 1 per cent of vines each.

Pruning and trellising

45 per cent of all vineyards surveyed were trellised with 'VSP Double Guyot', 17 per cent with 'VSP Single Guyot' and the balance with Scott Henry, Cordon, GDC (Geneva Double Curtain), Sylvoz and 'Chablis Cordon'. Some growers opted for 'don't know'. It would have been good to be able to carry out more analysis on yield in relation to training system, but this was outside the budget.

Factors which result in the highest yields

Based upon the results of the 2018 survey, it is possible to suggest where and how a vineyard should be planted to get the maximum yields:

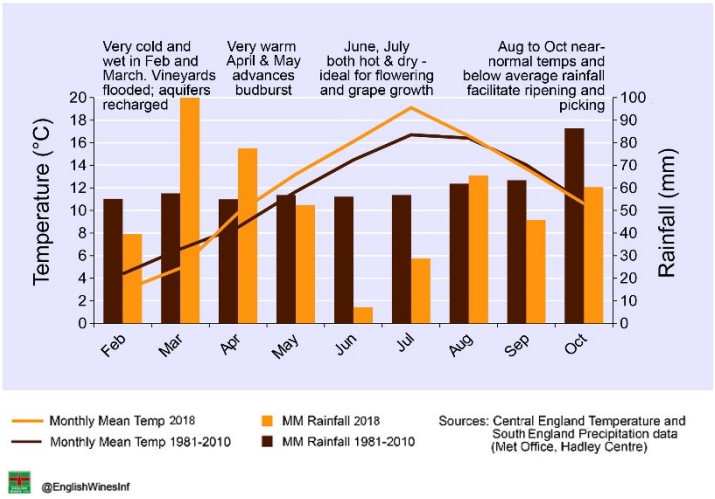
- The vineyard should be planted:
    - In the South East of England
    - At between 61 and 80 m above sea level
    - At a row width of 2.00 m to 2.10 m
    - At intervine distance to give at least 4,000 vines-ha e.g. 2.00 x 1.25 m
    - Selected purely on yield, the following varieties are best:
        - Still wine
            - Madeleine x Angevine 7672
            - Regent
            - Reichensteiner
            - Seyval blanc
        - Sparkling wine
            - Chardonnay
            - Meunier

Stephen Skelton MW
Chairman – WineGB Viticulture Working Group
August 2019

Harvest Report - 2018

There are two schools of thought about UK vintage 2018. The first is that it was a portend of things to come; a harbinger of early, ripe, large harvests that we will be seeing many more of in the post-Brexit future. The other view (and the one I am more inclined towards) is that it was a climatic abnormality, a year when the stars aligned and four perfect weeks of weather, centered on flowering, managed to produce a massive harvest (around three times the hitherto average yield) with bunch weights off the scale, and sugar levels to match and that we will be unlikely to see its like for years to come. Of course, UK viticulture has seen large years before: 1983, 1992, 2006, 2014 – all years with well-above average yields – but nothing on the scale of 2018. Peter Hayes considers that the good weather in late spring and early summer 2017 (which enabled many growers to produce good crops even after having been frosted) was propitious for fruit formation in the growing canes which played a significant part in the size of the 2018 harvest.

2018: Temperature & Rainfall Overview

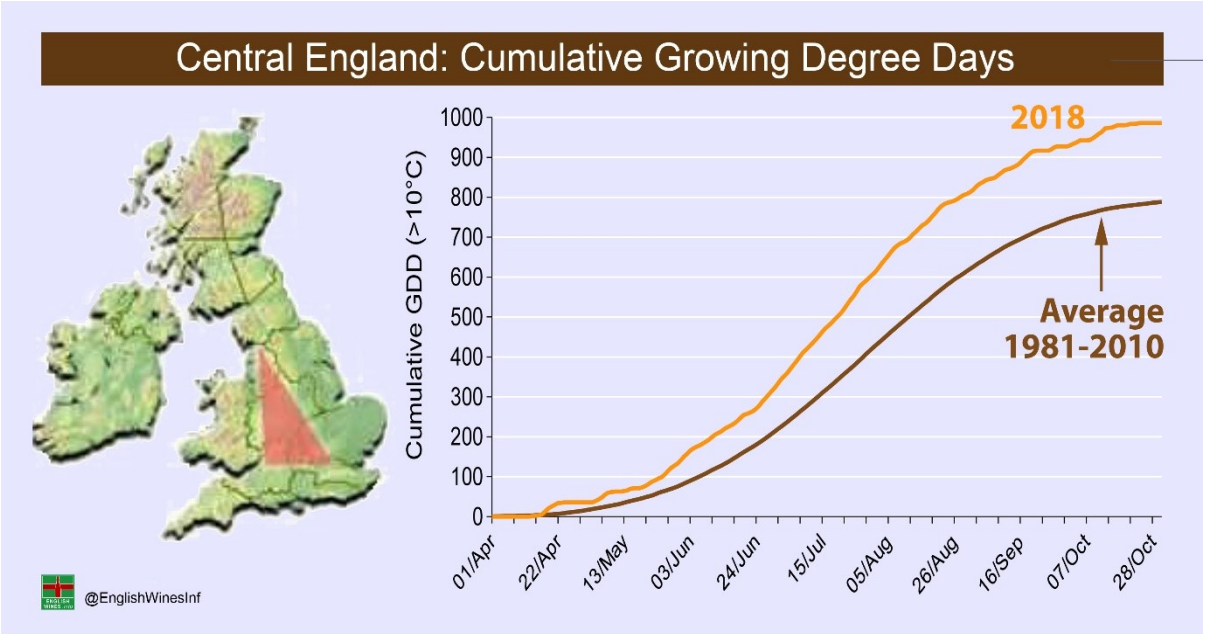


The start of 2018 was nothing special and was dominated by what journalists nick-named 'the Beast from the East' which, starting on 22 February, brought rain, snow and icy weather to much of the country for the next four weeks. Consequently, February and March temperatures were lower than the LTA[i] although rainfall was higher and by the end of March, aquifers were well topped up. The beginning of April was still cold, although some vineyards reported buds bursting on the 14 April, and by the middle of April things were not looking too good. Many growers thought we were in for another difficult year. Heavy rains meant that some new vineyard sites were too wet to work and, in some cases, planting of new vines was delayed. However, as April turned into May, things changed. The last few days of April were unseasonably warm, 25°C was recorded in some vineyards, but the beginning of May saw frost in some parts of the country – Hampshire seemed to be the worst affected county – but most vineyards in the South-East and East Anglia escaped any significant damage. The rest of May was warmer than usual and the month as a whole was almost 2°C over the LTA. Between mid-May and mid-June, the season went from being two to three weeks late to two to three weeks early, a turnaround that I would never have believed possible and have not witnessed before. Temperatures during the early part of June were unseasonably high, and flowering started in some Chardonnay vineyards on 9 June which must be the earliest date ever. The last 3 weeks of June saw perfect flowering weather in most well-sited vineyards including three consecutive days with

[i] LTA - long-term average 1981-2010

temperatures of 30°C or more, a very rare occurrence in the UK for this month. This amazing weather allowed a high percentage of flowers to set, and, more importantly, helped the 'rachis' (the actual structure of the bunch) to expand and grow, thus making space for all those grapes. This was the principal reason bunch weights were in many cases two to three times their normal size, a factor which helped many growers pick two to three times their normal harvest (it is reliably reported that one bunch of Cabernet Cortis was just over 500 grammes).

The summer was good, with July being the second-warmest on record with temperatures significantly over the LTA. The Met Office reported that the period 1 June – 31 August (their 'summer') was the warmest since their records began in 1910. *Véraison* was earlier than normal, starting in some varieties in mid-July, although the Champagne varieties mostly turned at the start of August. Some useful rain came at the end of August (the August Bank Holiday weekend was a wash-out) and the beginning of September, a factor which helped swell yields in many vineyards. One grower with decades of experience of UK viticulture said that this rain alone accounted for the much higher yields in his vineyard. Harvesting started in some vineyards at the end of August (Ortega at Biddenden on 28th) and by mid-September a lot of growers were picking. A combination of a very heavy crop in many vineyards, plus warm dry weather for much of September and October meant that growers had the luxury of allowing their grapes to hang and ripen fully and taken as a whole, there were grapes being harvested somewhere in the UK for over two months.



2018 was undoubtedly a remarkable year for the UK. GDD[j] almost touched 1,000, a 25 per cent increase over the LTA of 800, a factor which went a long way to explaining the very high sugar levels. Some growers had Chardonnay at 12.5-13.5% abv and yields in some vineyards got up towards 25 t-ha (10 t-acre) for this variety. Several large producers reported average yields over all their vineyards of between 12 and 15 tonnes-ha (4.86 – 6.00 t-acre).

[j] GDD – Growing Degree Days April-October 10°C and above.

The total UK yield according to the Wine Standards Branch (WSB) was 98,289-hl (13.11 million 75 cl bottles), well over twice as large as the previous largest harvest (2014 – 48,267 hl). Average yield per hectare is not known at this stage (as the WSB appears not to have the figures to hand) but an educated guess puts the yield per hectare at around 45 hl-ha, almost double the previous 5-year (2013-17) average of 24.32 hl-ha, although only 20 percent higher than the previous highest yield per hectare which was 27 vintages ago in 1992 when it was 37.7 hl-ha. The current 5-year average (2014-18) yield is now 28.47 hl-ha which is still only around 4 tonnes-ha or 1.65 tonnes-acre.

Results from 2016, 2017 and 2018.

Yields Tonnes-ha	2016	2017	2018	Average 2016-18	Av. 2016-18 t-acre
Reichensteiner	8.36	4.37	16.60	9.78	3.96
Seyval blanc	6.40	11.24	9.38	9.01	3.64
Regent	No data	5.70	11.09	8.40	3.40
Rondo	No data	9.24	7.30	8.27	3.35
Meunier	5.88	5.24	9.53	6.88	2.79
Pinot Blanc	No data	4.86	7.85	6.36	2.57
Chardonnay	5.58	4.42	8.67	6.22	2.52
Madeleine x Angevine 7672	6.05	5.64	6.70	6.13	2.48
Pinot noir	3.00	4.31	7.93	5.08	2.06
Bacchus	3.07	4.21	5.48	4.25	1.72
Pinot Noir Précoce	1.81	3.50	6.62	3.98	1.61
Other varieties*	4.26	3.68	4.10	4.01	1.62
Average all varieties listed	**4.93**	**5.53**	**8.44**	**6.53**	**2.64**

The table above gives the yield data from the major UK varieties for 2016, 2017 and 2018. Only Reichensteiner, Seyval blanc, Regent and Rondo break the 8 t-ha (3.25 t-acre) mark, with the Champagne varieties nicely grouped around the 6-7 t-ha (2.43-2.83 t-acre) mark. Of course, when you take into account the commercial value of the different varieties, then a different picture would emerge. Bacchus is showing quite a low yield which I do not believe is really representative of the variety.

Yields Tonnes-ha	2016	2017	2018	Average 2016-18	Av. 2016-18 t-acre
Top 25% of vineyards - all varieties	8.84	9.57	10.52	9.64	3.90
Middle 50% of vineyards - all varieties	4.41	4.12	6.16	4.90	1.98
Bottom 25% of vineyards - all varieties	1.36	1.31	1.63	1.43	0.58
All Champagne varieties	4.49	4.55	8.71	5.92	2.39
All non-Champagne varieties	4.57	4.82	8.35	5.91	2.39
All varieties	**4.54**	**4.68**	**7.12**	**5.45**	2.20

As ever, the top quartile of growers by yield managed much better results that the other 75 per cent, with yields almost double those of the middle 50 per cent. Champagne varieties

were remarkable consistent over the three years which, considering the frosts in 29017, says something about the varieties.

Yields Tonnes-ha	2016	2017	2018	Average 2016-18
East Anglia	6.89	4.35	6.92	6.05
South East	4.31	4.61	9.90	6.27
South West	3.95	5.82	5.52	5.10
Thames and Chilterns	2.59	5.62		4.11
Wessex	2.08	3.44	9.93	5.15

Regional performance shows England's two driest regions, East Anglia and the South East pretty even in terms of yield, with the wetter and windier parts of the country trailing behind.

Stephen Skelton MW

August 2019

Appendix II - UK Vine varieties 2018

UK Vine Varieties 2018	Hectares	Percentage
Chardonnay	637.5	27.38%
Pinot noir	617.6	26.53%
Bacchus	196.7	8.45%
Meunier	182.6	7.84%
Seyval Blanc	101.3	4.35%
Reichensteiner	67.9	2.92%
Rondo	53.6	2.30%
Solaris	47.3	2.03%
Müller-Thurgau	43.2	1.85%
Pinot noir Précoce	39.2	1.68%
Madeleine x Angevine 7672	38.6	1.66%
Ortega	38.6	1.66%
Pinot blanc	29.0	1.25%
Pinot gris	28.8	1.24%
Regent	28.6	1.23%
Phoenix	24.6	1.06%
Schönburger	21.6	0.93%
Siegerrebe	19.4	0.83%
Dornfelder	18.7	0.80%
Other varieties	90.4	3.88%
Total	**2328.1**	100.00%
Source: Wine Standards Branch of the FSA		

[i] **Technical Management Note I**
Vineyard performance is influenced by a combination of factors including seasonal conditions of both the preceding and current season; site factors including local wind, rainfall, temperature profiles, sunshine hours, soil texture and depth etc.; management techniques, inputs and decisions including what yield targets are required, degree of crop removal for maturity and style targets, canopy management, pest and disease control, fertiliser inputs etc. For the perennial grapevine, flower development commences in the spring/early summer of the previous year with flower development continuing into the subsequent spring; flowering and fruit-set is then completed in late June-early July of the next season. Warm, dry conditions at each of these stages encourages more and larger flower potential and actual fruit-set, provided vine capacity and management input is satisfactory. UK climate anomaly maps relative to 1961-1990 average;
(https://www.metoffice.gov.uk/public/weather/climate-anomalies/#?tab=climateAnomalies) illustrate that Year 2017 had exceptional spring and summer average temperatures thus encouraging high potential fruitfulness to carry into 2018 which itself was also exceptionally hot and dry, thereby allowing good fruit set of large flower clusters.

[ii] **Technical Management Note II**
It is possible that higher elevation vineyard with historically lower yields may have greater inherent capacity derived from their vine root, trunk and crown reserves. Relative to other vineyards which had also directed their productivity to good crops, these elevated vineyards may, under conditions leading to generally high fruitfulness and good fruit-set, have had more reserves to carry a greater crop.

[v] **Technical Management Note III**
Higher vine density arising from closer planting in-row or closer rows delivers more vines/ha. Missing or weak vines which arise from mechanical damage, variable and poor soil conditions etc. shall have proportionally greater negative impact on yield of the low density/wider-spaced vineyards.

[vii] **Technical Management Note IV**
Such close rows risk considerable canopy crowding and overshading from one row to the next. As such, sunshine input to allow initiation of flower development may be limited thereby restricting fruitfulness and crop potential.