

The 2016 vintage in Bordeaux

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It is always somewhat risky to announce a second great vintage in a row without appearing unduly optimistic. However, 2016 is unquestionably remarkable in Bordeaux, combining quality, quantity, and a very classic style.

Before looking into the effect of weather conditions on vine physiology and grape composition, let us once again consider the main parameters of a quality vintage in Bordeaux. A successful red wine vintage depends on five essential conditions:

- 1) and (2) - Relatively quick flowering and fruit-set during weather that is sufficiently warm and dry to ensure good pollination and predispose towards even ripening,
- (3) The gradual onset of water stress thanks to a warm, dry month of July in order to slow down and then put a definitive stop to vine growth no later than the beginning of *véraison* (colour change),
- (4) Full ripening of the various grape varieties thanks to dry and warm (but not excessively so) weather in the months of August and September,
- (5) Fine (relatively dry and medium-warm) weather during the harvest making it possible to pick the grapes in each plot at optimum ripeness without running the risk of dilution, rot, or loss of fruity aromas.

An incredibly wet spring was quite worrying for winegrowers at the time (danger of fungal diseases), but later proved to be a godsend. The soil's water reserves were largely reconstituted, enabling the vines to cope with the exceptionally dry, hot summer. The grapes finished ripening during beautiful, relatively warm weather, with very little rain and cool nights. This un hoped for, simply incredible weather for Bordeaux made it possible to harvest deeply-coloured, aromatic grapes with beautiful acidity.

The best white wine terroirs in Bordeaux (limestone, clay-limestone, and clay-gravel soils) protected the vines from premature or overly severe water stress. Sauvignon Blanc grapes retained surprising aromatic freshness and acidity on these types of soils. The Sémillon grapes were also very successful: plump and tender.

The dry, hot summer of 2016 was also conducive to the perfect maturity of grapes in Sauternes and Barsac prior to the development of botrytis. This is a vital prerequisite for the quality of sweet white wines. Two short, but significant rainy periods triggered the development of noble rot starting in mid-September. This was followed by a return to an anticyclone propitious to concentrating the grapes. Very spread out in 2016, the harvest began in the latter half of September and finished in early November.

A mild and extremely wet winter, followed by a gloomy spring, caused a delay in vegetative growth.

Although 2015 ended on a particularly dry, sunny note, the first three months of 2016 had above-average rainfall with accumulated precipitation close to 500 mm compared to the 30-year average of 230 mm (Figure 1, Table I).

Despite this grey, wet weather, temperatures were mild. In fact, the winter of 2016 was the most clement since statistics have been kept (Figure 2, Table I). No daytime sub-zero temperatures were recorded and there was frost on just five days.

That is why the first signs of vegetative growth (swelling buds) that appeared in late February gave the discomfoting impression of extreme precociousness. However, temperatures dropped to the seasonal average starting on the 20th of February and even less in the second ten-day period of March.

Cold temperatures in March and waterlogged soils due to heavy precipitation in the early part of the year delayed bud break, which began the last week in March, one week earlier than usual, earlier than 2010, 2012, 2013, and 2015 but as 2014.

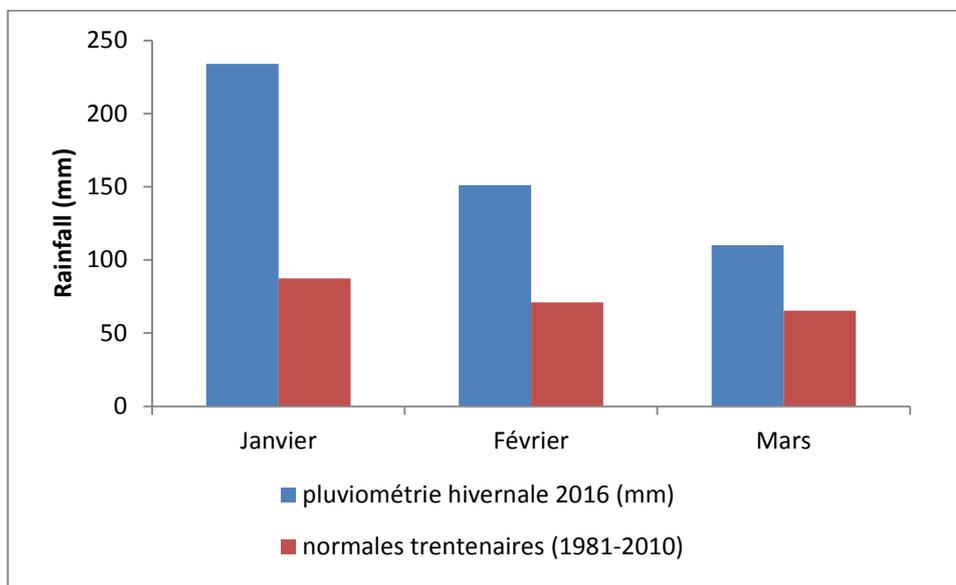


Figure 1
Cumulative winter rainfall (mm) 2016
Data from Mérignac (Météo France)

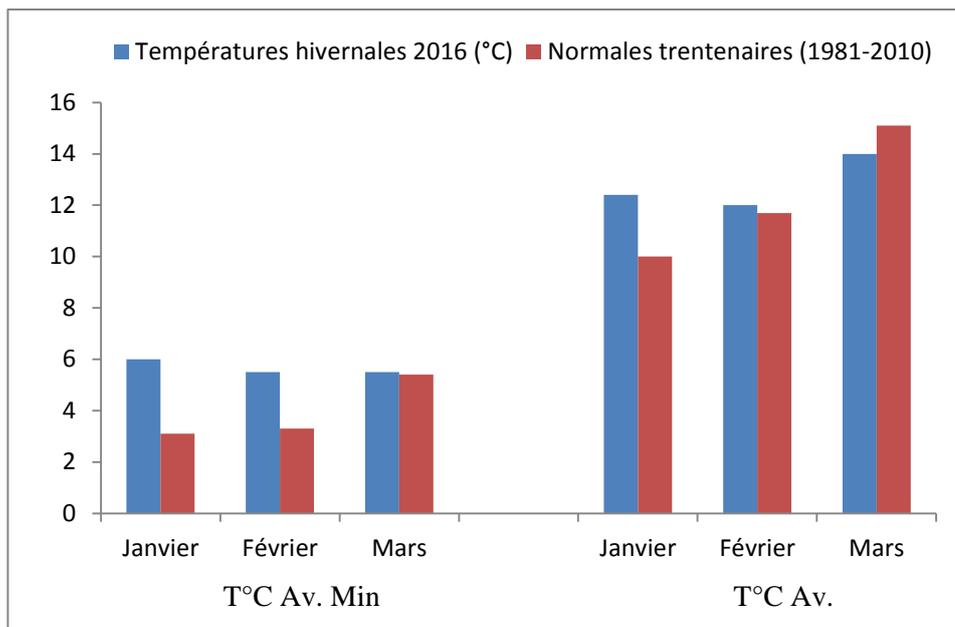


Figure 2

*Minimum and maximum temperatures in winter 2016
Data from Mérignac (Météo France)*

Table I

*Weather data for 2016: rainfall and temperature (compared to the 1981-2010 average) and hours of sunshine (compared with the 1991-2010 average)
Data from Mérignac (Météo France)*

	Hours of sunshine (h)		Precipitation (mm)		T°C average minimum (°C)		T°C. average maximum (°C)	
	2016	Average 1991-2010	2016	Average 1981-2010	2016	Average 1981-2010	2016	Average 1981-2010
January	58	95	234	87	6.0	3.1	12.4	10.0
February	95	115	151	71	5.5	3.3	12.0	11.7
March	145	170	110	65	5.5	5.4	14.0	15.1
April	162	182	60	78	7.4	7.4	16.8	17.3
May	189	217	93	80	11.4	11.0	20.9	21.2
June	180	239	74	62	14.4	14.1	23.5	24.5
July	273	249	13	50	15.8	15.8	27.2	26.9
August	313	241	11	56	16.1	15.7	29.4	21.7
September	221	203	65	84	14.6	12.9	26.9	24.0
October	166	147	11	93	9.0	10.4	18.9	19.4

Cool temperatures beginning in late February lasted until May (Table I, Figure 3). As often happens at that time of year, there were alternating warm and cold periods, with a large diurnal temperature difference that did not facilitate regular vine growth. Despite the rather early bud break, the weather until late May delayed vine growth. Phenological development

was also slower than usual (Figure 4). This situation was compounded in some regions by frost on the last three days of April that caused major damage in localised areas. This meant that, by late May, precocious vegetative growth was no longer the case and phenological maturity was comparable to 2014.

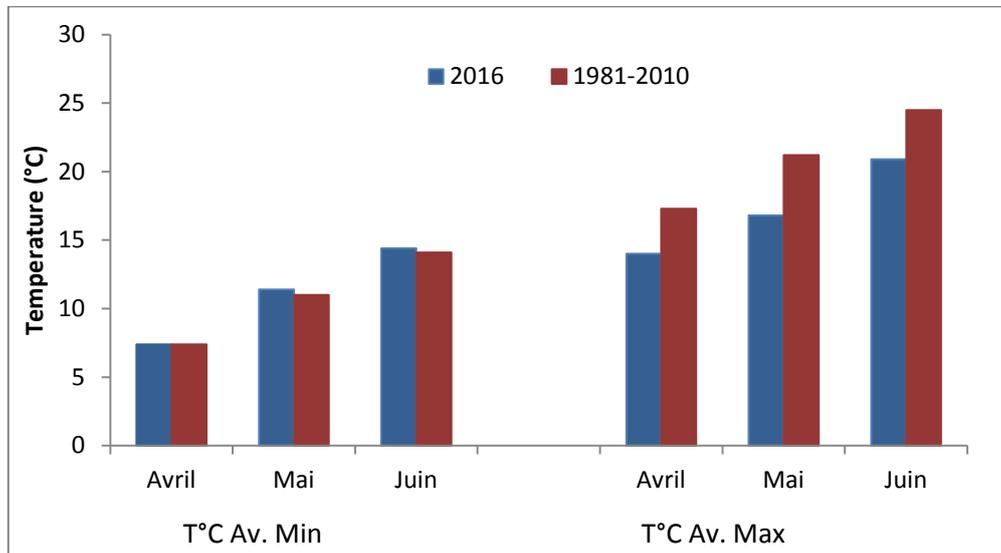


Figure 3

*Average, minimum, and maximum temperatures in the months of April, May, and June 2016
Data from Mérignac (Météo France)*

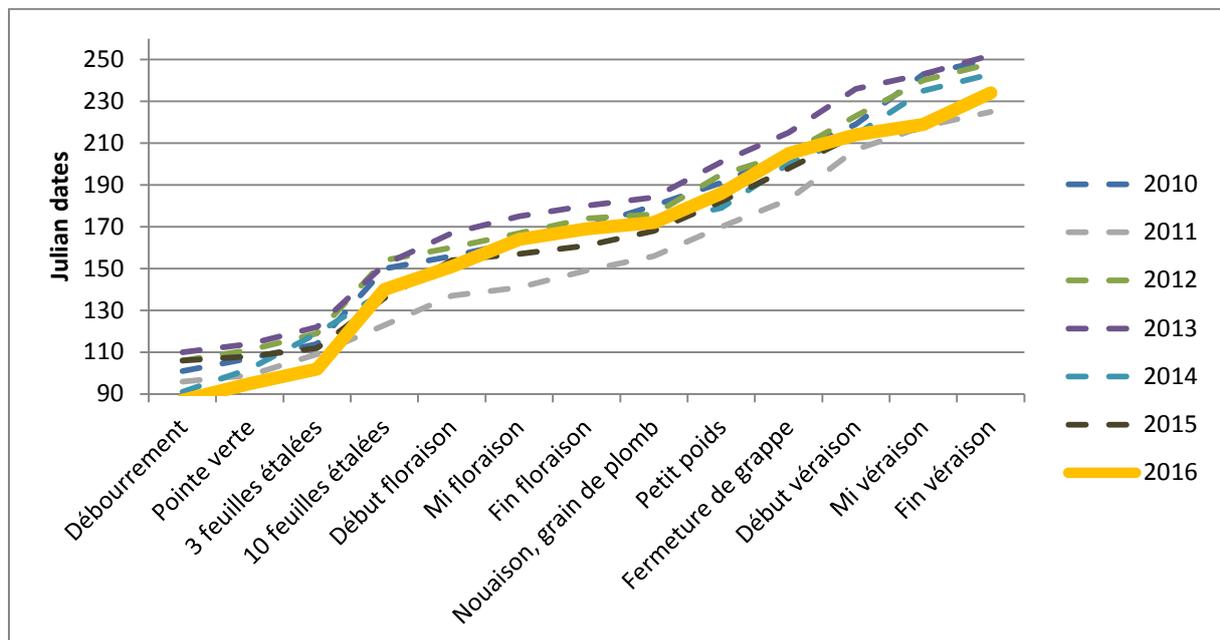


Figure 4

*Development of phenological stages in 2016
compared with 2015, 2014, 2013, 2012, 2011, and 2010 (Date SRAL and ISVV)*

A providential window of fine, dry weather at the beginning of flowering limited coulure

After a gloomy winter and rainy spring, there was some apprehension about flowering. Depending on the type of soil and its water retention capacity, some vines showed normal development, whereas others with a skimpy leaf canopy or on cold clay soil were behind. That explains why coulure (as in 2013) was feared.

Flowering began during rainy weather in the last days of May. However, there was a providential window of dry, warm weather between the 3rd and the 11th of June. Mid-flowering in our reference vineyards took place around the 11th of June, i.e. 8 days later than the 20-year average (Table II). The change in the weather fortunately avoided widespread coulure. The end of flowering in certain late-ripening plots was slightly perturbed by a final rainy period that caused some millerandage. Fruit set occurred 8 days later. Bunches were relatively homogeneous and the number of seeds greater than average – the sign of good pollination.

After three days of rain in mid-June (Figure 5), beautiful weather finally set in and proceeded to last for quite some time. This definitively changed the nature of the vintage. High temperatures in the last ten days of June enhanced berry development. These grew very quickly, and became "pea size" by the end of the month.

At this stage, the first two prerequisites for a good vintage, i.e. quick even flowering and fruit set, were fulfilled in most plots. Overall maturity was uniform with little coulure.

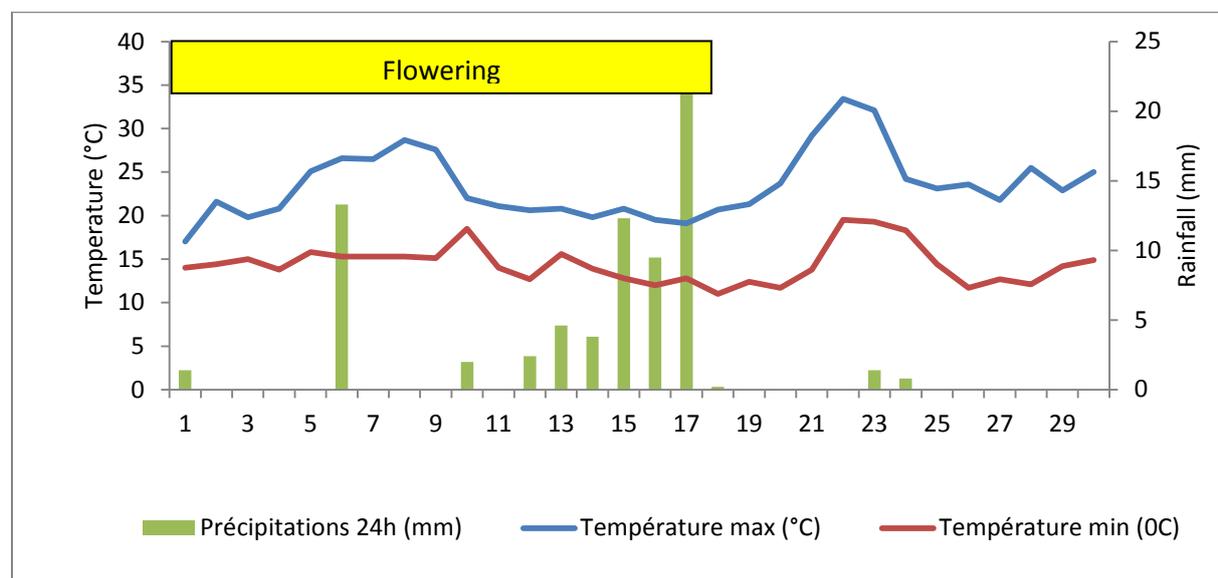


Figure 5
Daily variations in temperature and precipitation in June 2016
Data from Mérignac (Météo France)

An exceptionally hot, dry summer leading to lasting water stress

The remarkably fine weather in late June continued into July and August.

A few very hot days around the 15th of June degraded the herbaceous aromas without bringing growth to a halt. Rainfall was infrequent and light, while temperatures were normal and there was slightly more sunshine than usual (Table I). Due to heavy winter rains, the lack of water stress during vegetative growth accounts for the rather large size of the berries. Bunch closure took place about the 20th of July, as in 2011 and 2015 (Figure 4).

The water balance in late July was not conducive to stopping vegetative growth definitively (Figure 6) or triggering *véraison* in a significant way, except on clay-gravel soils. The grapes first began to change colour in the last days of July on terroirs prone to early ripening. However, seeing as vegetative growth had not completely stopped, *véraison* got off to a slow start. It took until the first week of August for colour change to become noticeably widespread (Table II).

Water stress was accentuated by the absence of rain. The situation was comparable to 2010 midway through *véraison* (Figure 6). These conditions were conducive to good structure in the cell walls and the accumulation of phenolic compounds, as well as facilitating the end of *véraison*.

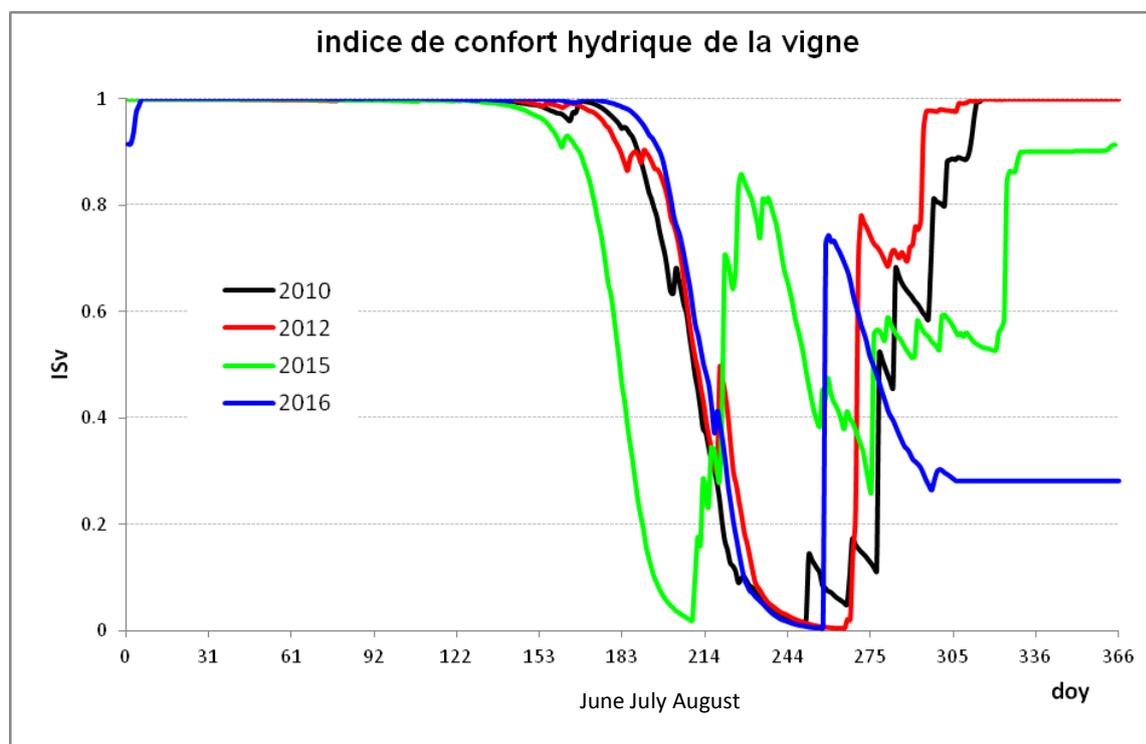


Figure 6

Variation in the water stress index in 2016 compared to 2015, 2012, and 2010.
Data from INRA (Philippe PIERI)

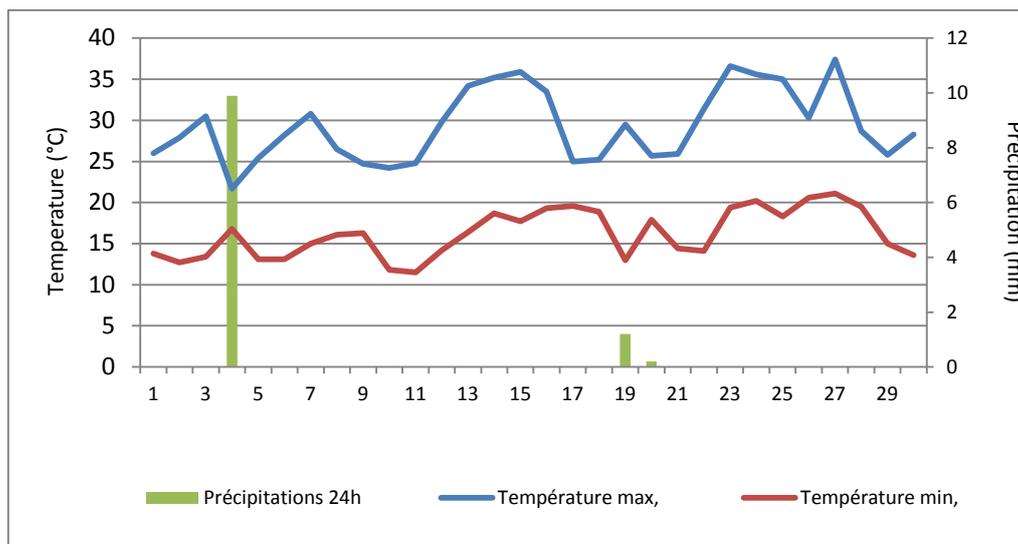
Table II

Mid-flowering and mid-véraison dates in 2016 compared to 2015, 2014, 2013, 2012, 2011, 2010, 2009, 2008, and the average of the past 10 years

Period	Mid-flowering	Mid-véraison
1995-2015	2 June	6 August
2008	11 June	15 August
2009	5 June	3 August
2010	9 June	9 August
2011	17 May	21 July
2012	11 June	12 August
2013	18 June	22 August
2014	7 June	13 August
2015	5 June	6 August
2016	11 June	7 August

A halt to vegetative growth, the 3rd condition for a great red wine vintage, was attained by mid-véraison. Although this occurred slightly later than hoped, colour change was complete enough for a perfect start to ripening.

The month of August featured real summer weather (Figure 7). It was very hot (5°C more than usual) with a remarkable amount of sunshine (+30% compared to an average year). Fortunately, minimum night-time temperatures were close to the thirty-year average, and even less on some nights. This large diurnal temperature difference guaranteed the potential formation of anthocyanins, while limiting the degradation of aromas and acids in the grapes. The absence of major precipitation caused excessive water stress in some locations, especially in plots of young vines, ones with high yields, and ones with shallow soil.

**Figure 7**

*Daily variations in temperature and precipitation in August 2016
Data from Mérignac (Météo France)*

Much-welcomed showers in early September gave a new boost to ripening

In late August, a few instances of scorching were noticed in vines that had undergone excessive leaf thinning and everyone began to wonder about the danger of inhibited ripening. A heat wave arrived in early September, with average temperatures of 30-32°C. The first 13 days of September were the hottest since 1950, reaching a record 37°C in Sauternes on the 12th of September.

A storm arrived from the Basque Country late in the afternoon of the 13th of September. It rained throughout Bordeaux the following night, with varying intensity depending on the region (Figure 8, Figure 9). A depression lasting three days brought as much as 40 cm of rain in some parts of Bordeaux.

However, the sun returned on the 20th of September and, with it, fine weather that lasted until the end of the harvest.

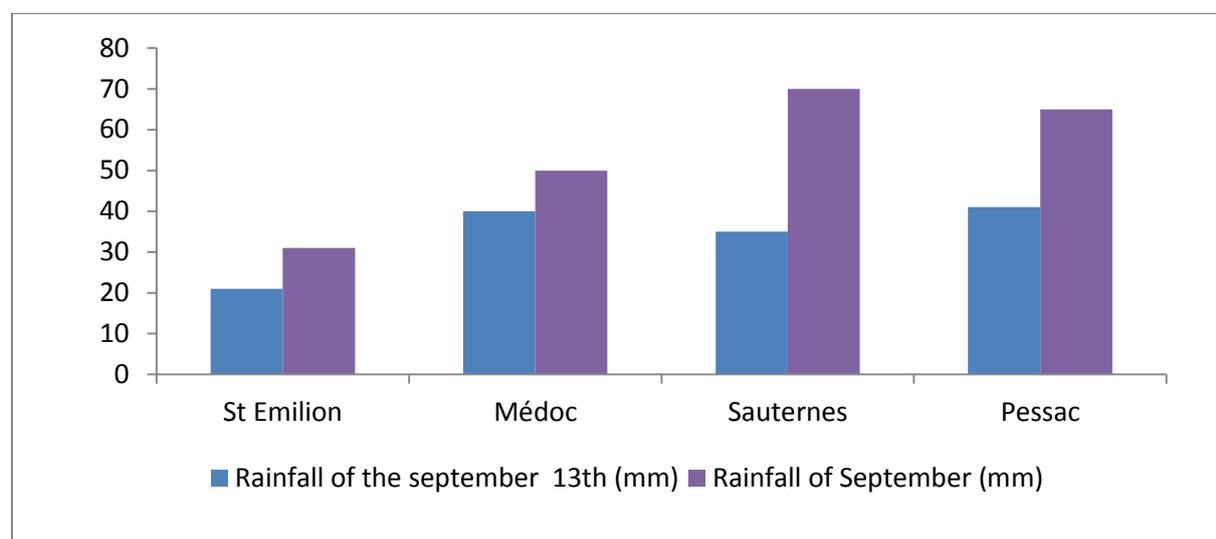


Figure 8

Breakdown of precipitation (mm) by region in September 2016

This rainy period gave a new impetus to ripening. Cabernet Sauvignon and late-ripening Merlot grapes benefited particularly from this.

A sunny mid-September and month of October virtually without any rain completed ripening and made for a leisurely harvest

Once again, the month of September was decisive for the quality of the vintage. October was dry and sunny, with cool nights making it possible to wait serenely for the best time to pick all grape varieties (Figure 9).

The rain in early September gave a boost to maturity, which nevertheless took more time than usual to be reached. The sunshine and relatively cool night-time temperatures were

conducive to the unusually large accumulation of phenolic compounds, as well as the preservation of aromas and acidity.

These weather conditions stopped grey rot from developing, except in certain parts of Bordeaux where fairly heavy rain in early September forced winegrowers to pick early.

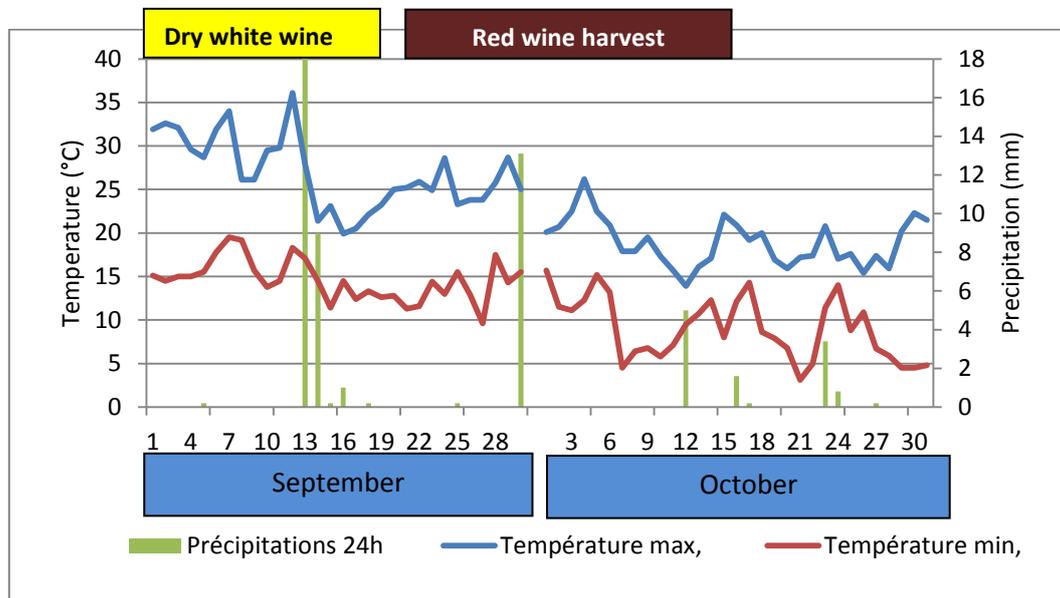


Figure 9

*Daily variations in temperature (°C) and precipitation (mm) in September and October 2016
Data from Mérignac (Météo France)*

The rain in early September, followed by a dry, but not excessively hot period, ensured that ripening would start up again – the fourth condition for a great red wine vintage. The month of October was just as sunny, but cooler, enabling the Cabernets to ripen fully.

Despite the heat in June and July, the 2016 vintage was not particularly early.

The dry white wine harvest began in the Graves and Pessac-Léognan appellations at the very beginning of September (Table III, Figure 9), about one week later than in 2015. After a remarkably dry month of August, the grapes were in perfect condition, without a trace of grey rot. Although they quickly attained sufficient sugar levels, their potential fruitiness, which had stayed in the background for a long time, also came to the fore at the end of ripening. The showers in mid-September did not have a major effect on the grapes, which could be picked without any need to hurry. Yields were very satisfactory, especially for Sauvignon Blanc, where such prolific production had not been seen in years.

The freshly-picked grapes had lower sugar levels than in 2015, but in keeping with the previous 5-year average. Total acidity was slightly lower than in 2013, 2014, and 2015, and similar to 2011 (Table IV). The balance between sugar and acidity gave rise to hopes that 2016 would be a good vintage for white wines, especially those from soils where they are traditionally successful (limestone, clay-limestone, and clay-gravel) and which are conducive to retaining good acidity.

Table III

Harvest dates for grapes in the Graves region used to make dry white wines in 2011, 2012, 2013, 2014, 2015, and 2016

	Sauvignon Blanc	Sémillon
2011	22 - 31 August	1 - 5 September
2012	3 - 10 September	10 - 18 September
2013	10 - 22 September	21 - 25 September
2014	6 - 12 September	12 - 20 September
2015	28 August - 6 September	5 - 11 September
2016	2 - 15 September	8 - 18 September

Table IV

Composition of Sauvignon Blanc grapes from a plot with limestone soil in the Graves region in 2011, 2012, 2013, 2014, 2015, and 2016

	Potential alcohol (%)	Total acidity (g/l)	pH
2011	11.6	5.6	3.05
2012	12.9	5.3	3.05
2013	12.4	6.0	2.92
2014	12.4	7.6	3.05
2015	13.0	6.3	3.00
2016	12.4	5.6	3.00

The red wine harvest began with the most early-maturing plots of Merlot in the third week of September, but most grapes were picked in early October, i.e. one week later than usual. Harvesting of the Cabernets and Petit Verdot went on until just after mid-October during sunny weather (Figure 9).

Therefore, the fifth and final prerequisite for a good red wine vintage – fine weather during the harvest – was perfectly fulfilled in 2016.

Ideal conditions for harvesting excellent quality grapes

The red wine grapes in 2016 were characterized by a reasonable degree of potential alcohol and an outstanding phenolic composition.

As opposed to other French regions adversely affected by violent weather, the vintage in Bordeaux was generous. This can be explained by the large number of grapes per cluster as well as their size (Figure 10). Because water stress manifested itself rather late, the berries were comparable in weight to 2015, but lighter than in 2010 (Figure 11, Table V). The very low malic acid content – the lowest since 2009, except for 2011 (Figure 11) – was due to the hot, dry summer weather.

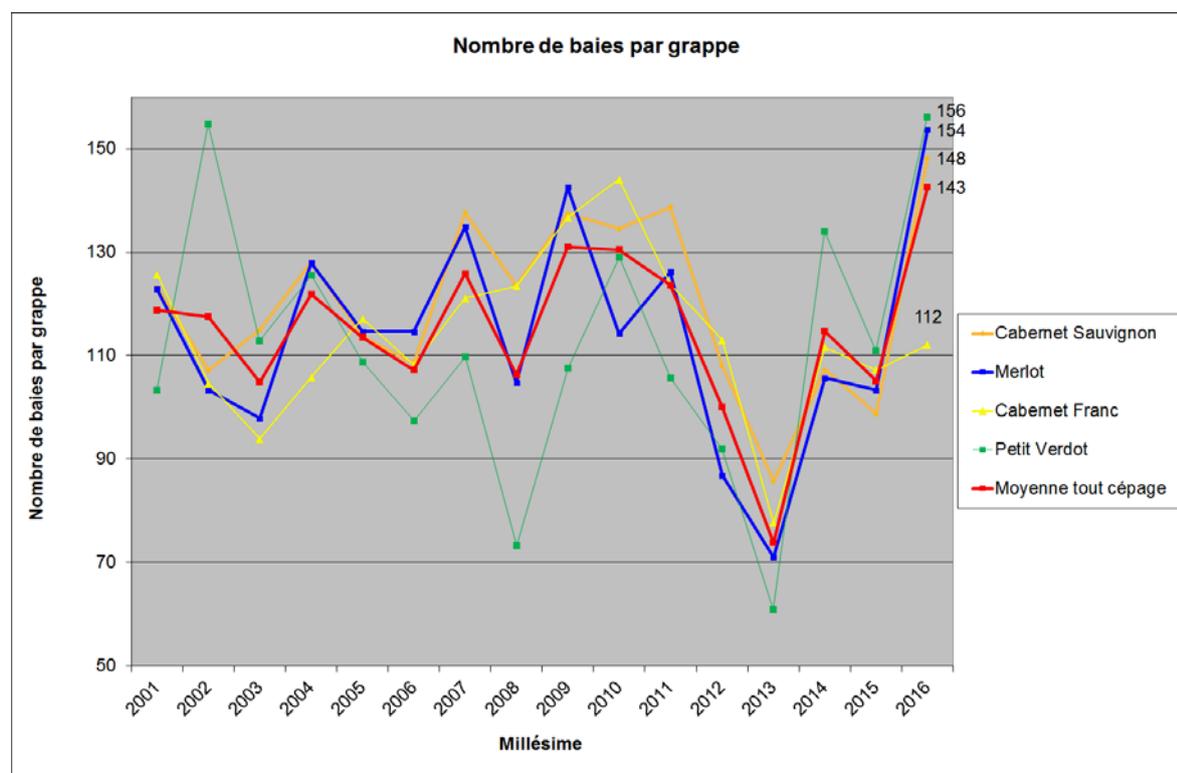


Figure 10

Number of berries per cluster for various grape varieties at an estate in Pauillac for the past fifteen years

These meteorological conditions enhanced the degradation of isobutyl-methoxypyrazine. This compound, responsible for "green pepper" aromas in Cabernet, was practically unable to be detected from the very beginning of the ripening process.

Table V
Variations in grape sugar content and acidity during ripening

	Weight per 100 berries (g)	Sugars (g/l)	TA (g/L H ₂ SO ₄)
2016			
5/9 Merlot	134	203	4.1
Cabernet Sauvignon	114	187	5.4
26/9 Merlot	151	246	3
3/10 Cabernet Sauvignon	119	223	3.2
2015			
6/9 Merlot	131	239	3.7
Cabernet Sauvignon	118	224	4.5
20/9 Merlot	147	264	3.0
Cabernet Sauvignon	124	247	3.7
2014			
8/9 Merlot	185	197	6
Cabernet Sauvignon	141	190	6
21/9 Merlot	184	229	4.1
28/9 Cabernet Sauvignon	142	223	5
2010			
3/9 Merlot	120	198	4.3
Cabernet Sauvignon	101	171	6.1
20/9 Merlot	125	242	3
27/9 Cabernet Sauvignon	108	225	3.6
2009			
3/9 Merlot	155	203	4.3
Cabernet Sauvignon	149	178	5.7
20/9 Merlot	113	249	2.4
Cabernet Sauvignon	130	226	3.5

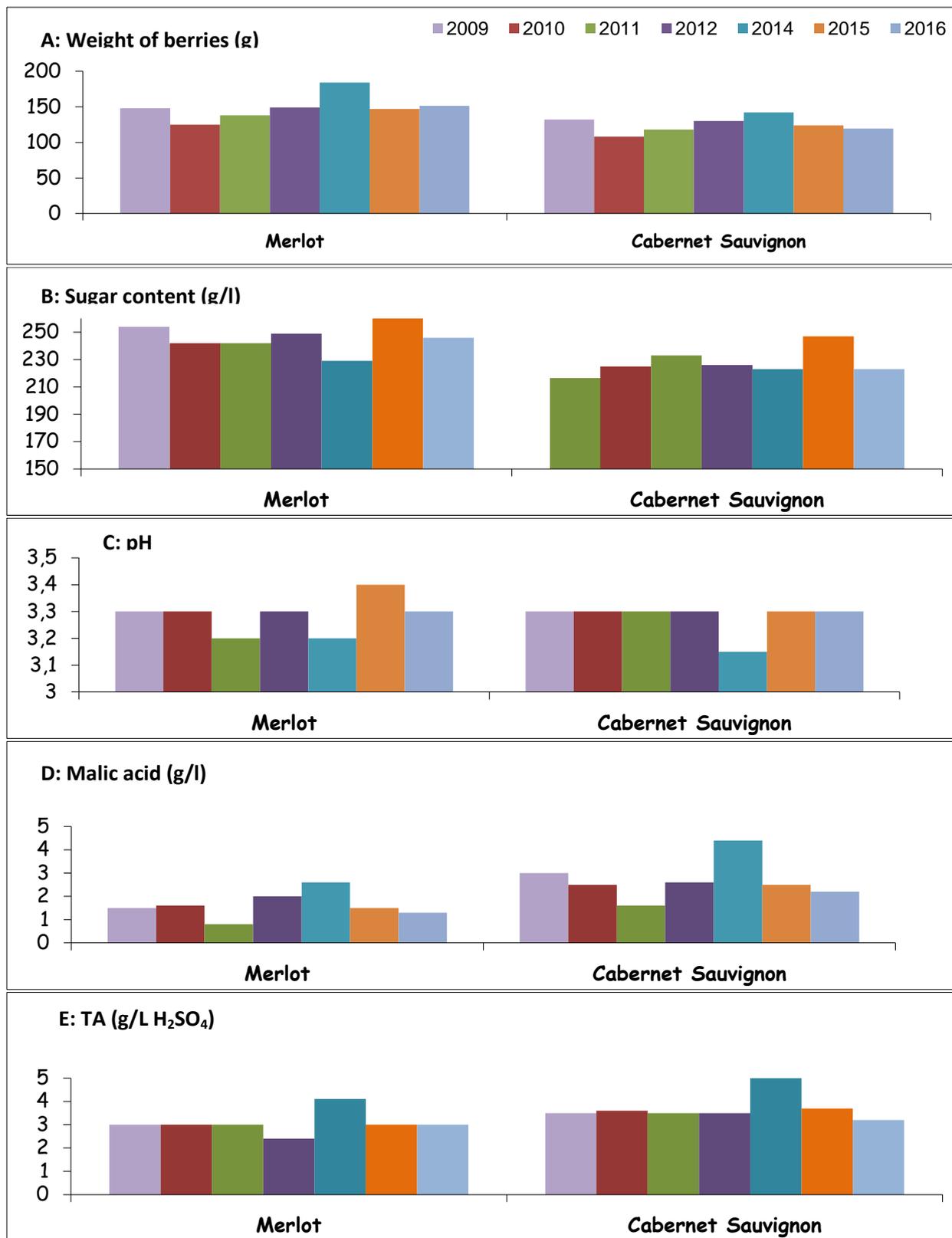


Figure 11

Analytical characteristics of berries in the 2016 vintage, compared with 2009, 2010, 2011, 2012, 2014, and 2015 of Merlot and Cabernet Sauvignon grapes in various plots used to define maturity

A: Weight in grams per 100 berries – B: Sugar content (g/L) – C: pH
 – D: Malic acid (g/l) – E: Total acidity (g H₂SO₄/L)

Alternating cool nights and sunny days in September was conducive to the remarkable accumulation of anthocyanins. Content was higher than in 2015 or 2009, and close to 2011 (Figure 12). Extraction took place slowly and varied according to grape variety (Figure 13). Extractability was greater for the Cabernets than for Merlot – proof of excellent maturity in the later-ripening varieties. Colour was deep and the tannin in the seeds was most often ripe and of high quality in 2016.

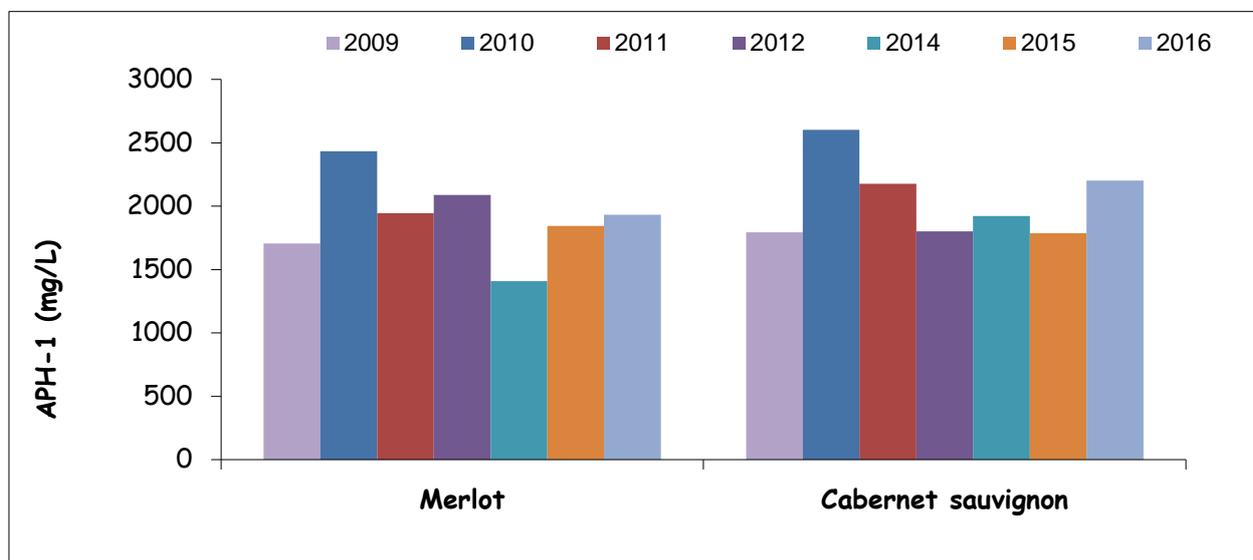


Figure 12

Total anthocyanin content (mg/L) of Merlot and Cabernet Sauvignon berries in 2016, 2015, 2014, 2012, 2011, 2010, and 2009 in our reference vineyards

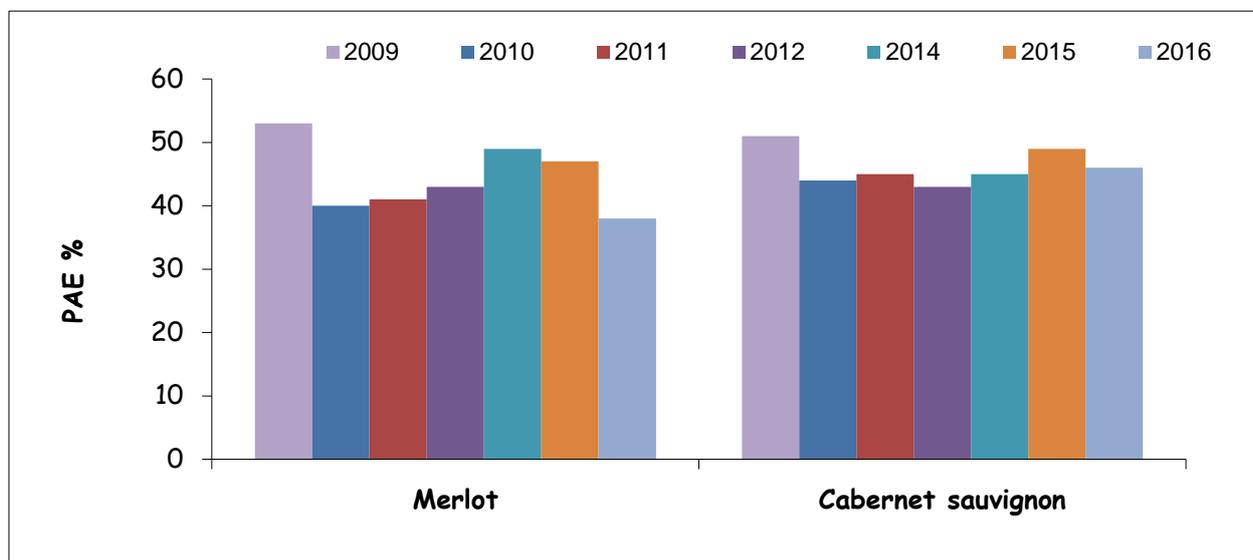


Figure 13

Potential anthocyanin extractability (%) of Merlot and Cabernet Sauvignon berries in 2016, 2015, 2014, 2012, 2011, 2010, and 2009 in our reference vineyards

Due to the lack of rainfall until mid-September, botrytis took its time to appear and so grapes in Sauternes and Barsac were essentially concentrated at first thanks to raisining. However, showers on the 13th and 30th of September triggered the development of noble rot on perfectly ripe grapes, and their concentration was enhanced by the return of fine weather (Figure 14). Picking during the second *trie*, or pass, constituted the lion's share of the best part of the harvest, which lasted until early November. The quantity of wine made at several estates reached a record high.

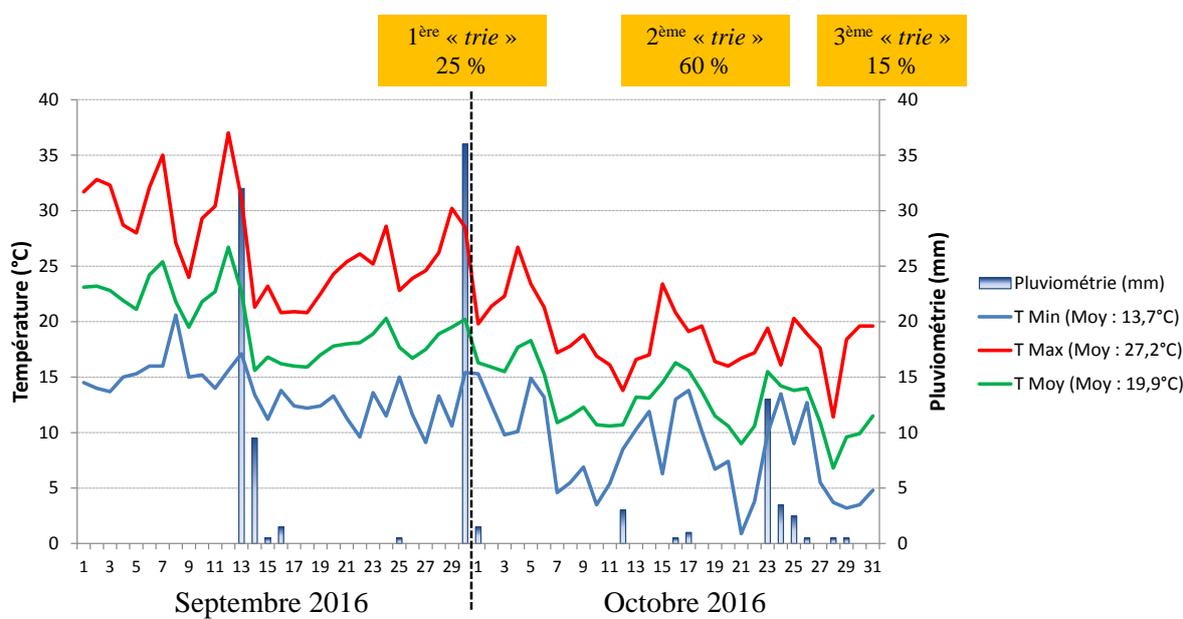


Figure 14
*Daytime temperatures and precipitation in September and October 2016 in Sauternes
 Chronology of the development of noble rot and the progression of passes (example)*

Good dry white and sweet white wines, and outstanding red ones

The 2016 dry white wines are good. They are fruity and flavoursome, less acidic than the three previous vintages, and well-balanced. The Sémillon wines were especially successful in 2016, adding body and softness to the blend, but without heaviness.

The great wines of Sauternes and Barsac are extremely pure. Very rich and showing candied fruit overtones, they display a style that emphasises power rather than bright aromatics or freshness.

At the beginning of ageing, the 2016 red wines give every indication of being outstanding. They have an amazing colour. They are also fruity, without any herbaceousness, and combine the tannic power of great vintages with a deliciously velvety texture. Their relatively high level of acidity gives them an admirable freshness and tremendous balance, without any hardness. The vintage is unprecedented, more classic than 2009 or 2015, and seems to have very long ageing potential.