

# Phenology: Follow the internal clock of the Vines

>>> The development of the vine throughout the year is punctuated by the appearance of key stages such as the bud-burst, the flowering and the veraison (color change). The precise monitoring of these stages on the scale of a vineyard is essential in ensuring a successful technical management. It provides the means for ascertaining the relative ripeness levels of the parcels, to characterize the current vintage and to precisely effectuate the technical operations such as the phytosanitary treatments. <<<

## ■ The phenology of the vine

The phenology is defined as a succession of development stages of living beings throughout a season and in relation to the climate. It applies to vegetal matter but also to animals. For the vine, several notation scales have been published, the most well-known are those of Baggiolini<sup>1</sup>, Eichorn et Lorenz<sup>2,3</sup> et BBCH<sup>4</sup>.

Baggiolini describes the stages from A (winter bud) to N (maturity), Eichorn and Lorenz from 1 (winter bud) to 38 (maturity) and BBCH from 00 (winter bud) to 89 (maturity) and 97 (leaf-fall). Phenology constitutes a veritable biological clock for the vines, which is useful when comparing vine parcels at an equivalent development stage.

The notation scales are very detailed, but the majority of stages are difficult to note since their definition is relatively imprecise, as for example "Bunch closing" or even "maturity". For these stages, the observations of different observers will be inconsistent. However, there exist three stages that can be noted with great noted precision and we can, thus, consider them to be the most important:

- The stage of "green-tip bud burst" ((Baggiolini "C", Eichorn et Lorenz stage "5" et BBCH "07").
- The stage of flowering (Baggiolini stade "1", Eichorn et Lorenz stage "23" et BBCH "65").
- The stage of veraison or color change (Baggiolini stage "M", Eichorn et Lorenz stage "35" et BBCH "85").

It is evident that vine-plant organs of each parcel will not reach a given stage at the same time. To precisely determine the date, it is common to consider the moment where 50 % of the vine-plant organs, or of a parcel, have attained the stage in question.

## ■ The usefulness in noting the principle phenological stages

The notation of the phenological stages is important for researchers but equally for winegrowers. The notation of the phenological stages of the vines has several applications.



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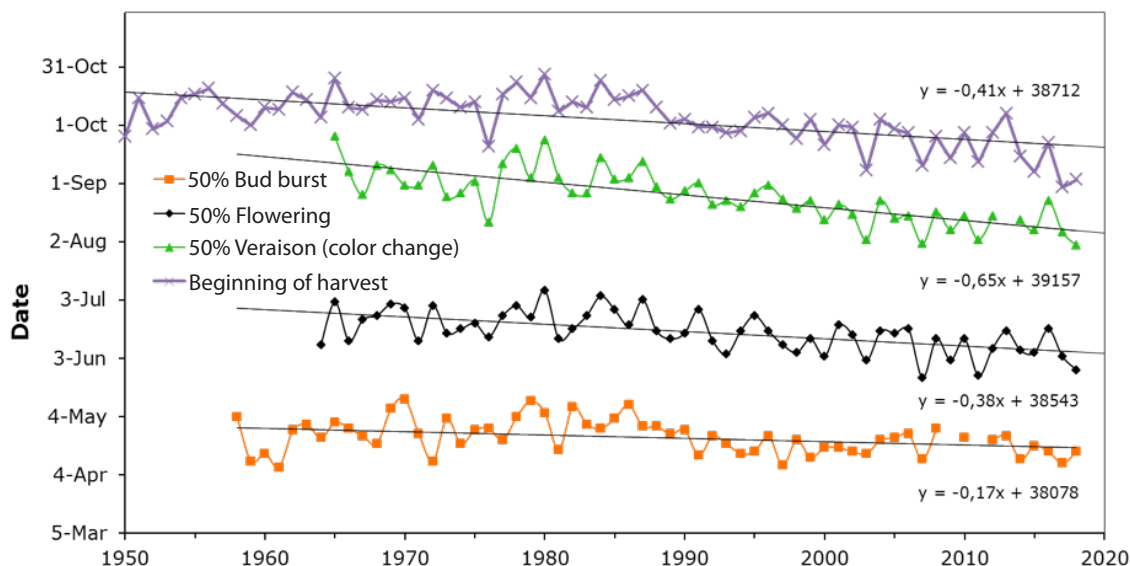
### → Timing of vineyard interventions

A vine parcel may be more or less ripe depending on the climatology of the year, the type of soil or the plant matter (grape variety, clone, root-stock). Certain interventions such as the application of plant protection products, defoliation or thinning-out, must be undertaken at a very precise development stage of the vines.

A phenological monitoring of the vines allows the winegrower to most accurately conduct these interventions.

### → Monitoring of the ripeness in the long term

Establishing a series of phenological notations in the long term on certain reference parcels of a vineyard property or a region allows, in the first case, to precisely establish their relative ripening stage, which is useful, for example, in establishing the chronology of the harvest, and furthermore in monitoring the ripeness of a parcel over time. Under the effects of climate change, the phenology of the vines advances over time on the majority of the vine parcels and the precise notation of the phenology allows us to quantify this phenomenon at a local level. Observations carried out over the last 60 years on



**Figure 1.** Evolution of the phenology for the Riesling grape variety in Alsace. Data: bud burst, flowering, véraison (color change): Inra Colmar; dates of beginning of harvest: Conseil Interprofessionnel des Vins d'Alsace (CIVA).

Rieslings in Alsace showed an advancement for mid-bud burst by 10 days, mid-flowering by 23 days, mid-veraison (color change) by 39 days and beginning of harvest by 25 days (Duchêne and Schneider, 2005; Figure 1)<sup>5</sup>.

### → Evaluating the effect of certain vineyard practices

Certain practices, such as the pruning date, or the leaf/fruit ratio, may modify the early ripening of the vine cycle. In certain cases, it may be desirable to delay it to avoid the grape ripening in the warmest parts of the summer; in other cases, it would be desirable to speed up the ripening in order to guaranty a sufficient level of grape maturity. A precise monitoring of the phenological stages allows for the evaluation of the impact of certain operations on the ripeness. It may also be interesting to compare the early ripening of different types of plant matter, for example different clones of the same grape variety.

### → Forecasting the harvest date

The phenology of the vines responds very well to temperature. The vine growth cycle is more early-ripening in a warm year and more late-ripening in a cool year. It is also more early-ripening in a "warm" soil as compared to a cool soil. The monitoring of the phenology from the bud burst to the flowering and then the veraison (color change)

provides knowledge, relatively early in the season, about whether the harvest will be earlier or later. This forecast becomes more precise over the successive stages.

## ■ Conclusion

The monitoring of the phenology of the vine at the vineyard level is very useful for the cultivation control and management, the comparisons between parcels or the inter-annual comparisons. It is critical that the monitoring be rigorously undertaken. In order to effectuate precise notations, we propose to follow the presented methodology in another IVES Technical Reviews article called "Measuring the phenology to more effectively manage the vineyard" which is accessible through <https://ives-technicalreviews.eu/article/view/2586>. ■

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## Choosing correctly the parcels to monitor

It is difficult if not impossible to precisely note the phenology of the entirety of the parcels of one given property. So as to have a useful yet feasible monitoring, one must establish a network of reference parcels that effectively represent the principle grape varieties, types of soils and sun-expositions within a property. One must monitor the same parcels and, if possible, the same plant stocks in each one of the parcels in order to establish long series of data. After a period of 10 years the results may then be presented as "a deviation from the average".

**1** Baggiolini, M., 1952. Les stages repères dans le développement annuel de la vigne et leur utilisation pratique. *Rev. Romande Agric Vitic.*, 8, 4-6.

**2** Eichhorn, K.W., Lorenz, D.H. (1977). Phänologische Entwicklungsstadien der Rebe. *Nachrichtenblatt des Deutschen Pflanzenschutzdienstes, Braunschweig* 29:119-120.

**3** Lorenz, D., Eichhorn K., Bleiholder, H., Klose, R., Meier, U., Weber, E. (1995). Growth Stages of the Grapevine: Phenological growth stages of the grapevine (*Vitis vinifera* L. ssp. *vinifera*) - Codes and descriptions according to the extended BBCH scale. *Aust. J. of Grape Wine Res.*, 1, 100-103.

**4** Meier, U., Bleiholder, H., Buhr, L., Feller, C., Hack, H., Hess, M., Lancashire, P., Schnock, U., Stauss, R., Van Den Boom, T., Weber, E., Zwerger, P. (2009). The BBCH System To Coding The Phenological Growth Stages Of Plants—History And Publications. *Journal Für Kulturpflanzen*, 61, N°2, 41-52.

**5** Duchêne, E., Schneider, C., 2005. Grapevine And Climatic Change: A Glance At The Situation In Alsace. *Agron. Sustain Dev.*, 25, 93-99.

<https://hal.archives-ouvertes.fr/hal-00886271/document>