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Measuring the phenology to more effectively manage the vineyard

>>> Phenology is concerned with the periodic phenomenon of the vine growing cycle (bud burst, flowering, veraison), in relation to the climate. It is a veritable biological clock of the vines. The timing of the numerous operations in the vineyard (phytosanitary protection, defoliation, crop thinning…) is undertaken in accordance with the phenological stages. Since the precociousness of the latter is directly linked to the temperature, the phenology is also a marker of global warming. <<<

For vintners, consultants and researchers, it is important to closely follow the phenology of the vines with an appropriate and solid methodology. Within the framework of the Perpheclim project, a group of French researchers realized a technical sheet describing the protocol for observing the phenological stages. The harmonization of the methodology allows not only to possess more reliable data, but also to more easily compare the acquired observations in different sites by different observers.

The three principle vine growth stages observed are the budburst, the flowering and the veraison. The adoption of a common language for all experimenters will permit the facilitation of exchanges and constitute a series of comparable data, particularly useful when exploring the consequences of climate change. Consequently, we propose in this technical sheet, evaluation methods of these three stages that were established by a work-group within the framework of the «Perpheclim du Métaprogramme ACCAF» project. We have decided to use the BBCH scale[1,2] so as to permit the comparison with other plant species, both annuals and perennials. We reference the correspondence with the defined stages as per Baggiolini (1952)[3].

Budburst and leaf emission/BBCH 07 - Stage C 50 % of stage, small green or red tips

The budburst represents the starting point of the plant growth with the appearance of the first leaves. From this moment on, the plant will, once again, start its photosynthetic activity and shift progressively from a growth based on its reserves to a growth based on the production of newly synthesized carbohydrates.

- For notations, take into account only the vine-plants that are definitively established and in production.
- We recognize that a bud is in budburst if we see a small green or red tip.
- We consider only the principal buds.



- The retained stage corresponds to the date at which 50 % budburst has been reached in relation to the number of productive buds left at the pruning.
- It is necessary to undertake the observations on at least five vine-plants per homogenous zone.
- Passage frequency: From the moment when a minimum of 5 % of buds have burst, do at least one additional passage with a maximum of one-week interval, in a manner to have one observation after 50 % of the buds have burst.
- The date of «50 % budburst» is obtained by interpolation between the observed values before and after 50 %.



BBCH 05
Woolly bud

BBCH 07
Visible green point

BBCH 07
Exceeded

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BBCH 60 - Beginning of flowering



BBCH 65 - 50 % flowers open (detached caps)



BBCH 69 - End of flowering

■ Flowering/BBCH 65 - Stage I Stage 50 % of flowers open

The flowering marks the beginning of the reproductive stage: the fall of the cap corresponds to the moment where the pollen will come into contact with the stigmas. The process of fertilization of the ovum that follows, conditions the formation of the berries and the pips, it thus constitutes a crucial moment in the development cycle.

- ➢ For notations, take into account only the vine-plants that are definitively established and in production.
- ➢ It is considered that a flower is open when the base of the cap is detached, regardless of whether it falls off or not. We estimate a level of flowers open. The retained stage corresponds to the date at which a level of 50 % is reached.
- ➢ It is necessary to undertake the observations on at least five vine-plants per homogenous zone.
- ➢ To determine the stage of 50 % flowering, we evaluate the level of flowering per vine-plant or by inflorescence, then we calculate an average.
- ➢ Passage frequency: From the moment when we observe a minimum 5 % of flowers open, do at least one supplementary passage with a maximum of one-week interval, in a manner to have one observation after 50 % of the flowers have opened.
- ➢ The date of «50 % of flowers open» is obtained by interpolation between the observed values before and after 50 %.

■ Veraison/BBCH 85 Stage M Stage 50 % of berries in veraison

The veraison marks the beginning of the ripening process of the grapes, that finishes at the harvest. ➢ For notations, take into account only the vine-plants that are definitively established and that are in production.

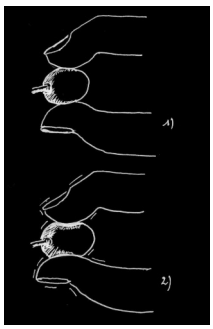
- ➢ We consider that a berry has completed its veraison if it is soft to the touch.
- ➢ This criterion permits an unbiased comparison of the grape varieties, whether white or red. Always undertake notations at the same hour, preferably in the morning.
- ➢ The retained stage corresponds to the moment at which the berries are soft to the touch.
- ➢ How to evaluate the level of berries after completed veraison? Two methods are possible:
  - By palpation of at least 100 berries on-site or in the laboratory (ex. 20 berries on 5 vine-plants). For certain varieties, it is, in fact, not possible to undertake one-time sampling of the berries since the bunches are too compact. It is therefore necessary to undertake the on-site evaluation without destructive sampling.
  - The use of the color appearance method is acceptable for interannual comparisons of the same grape variety at the same site. In this case, a visual estimate of the percentage of colored berries on the entirety of the bunches of the vine-plant must be effectuated.
- ➢ It is necessary to undertake the observations on a minimum of five vine-plants per homogenous zone.
- ➢ Passage frequency: from the moment when we have observed a minimum of 5 % of berries soft to the touch, do at least 1 supplementary passage with a maximum of one-week interval, in a manner to have one observation after 50 % of the berries are soft to the touch.
- ➢ The date of «50 % berry veraison completion» is obtained by interpolation between the observed values before and after 50 %. ■

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©Photo Inra. The photos of the budburst and flowering were excerpted from the movie « du bourgeon au raisin » filmed in 2004 by Jean-Louis Porreye and Clotilde Verriès ©Montpellier Supagro-Inra https://www.youtube.com/watch?v= GNymddTRhqw Graphics: Vincent Dumas (Inra Colmar)







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