About Grapevine Dormancy

Bud dormancy serves as an adaptive strategy that enables grapevines to cope with challenges such as drought, high and low temperatures, and freeze-dehydration stress. It is not a static condition but rather a dynamic phase in plant development that significantly influences the geographical range, yield potential, and management practices of many woody species, including grapevines (*Vitis* spp.).

According to the literature on the subject, the onset of grapevine dormancy is defined as beginning around August 1st in the Northern Hemisphere. In practice, as soon as the primary shoot begins to lignify at its base, the first latent buds located at the base of the lignified (hardened) shoots enter dormancy. These latent buds carry the potential crop for the following year (year N+1).

The key stages of bud dormancy, as outlined by Lang et al. (1987) and Horvath et al. (2003), include:

- **Paradormancy (Correlative Inhibition, Summer Dormancy):** Growth is regulated by physiological factors external to the bud, such as apical dominance — not to be confused with acrotony, which occurs on winter canes!
- **Endodormancy** (Rest, Vegetative Maturity): Growth inhibition originates within the bud meristem itself, requiring a period of chilling before growth can resume. In vineyards, latent bud endodormancy begins on primary shoots during lignification.
- **Ecodormancy** (Quiescence, Imposed Dormancy, or Winter Dormancy): Growth is limited by unfavorable environmental conditions.

Cold temperatures are essential for breaking dormancy, typically requiring around 250 hours (8 to 10 non-consecutive days) at approximately +8 °C. Even during dormancy, vines remain metabolically active, maintaining basic functions through respiration. Enzymes such as invertase continue to function at subzero temperatures (around –5 °C), converting starch into sucrose to provide energy necessary for respiration and subsequent bud development leading up to budburst.

The attached Figure 2 shows an example of daily average temperature records indicating the number of days with mean temperatures ≤ +8 °C. This information makes it possible to determine whether grapevine endodormancy has been released. In the present case, endodormancy was released in December 2023, meaning the vine has been in ecodormancy since that date (data from the Institut Agro Montpellier weather station).

Figure 1 illustrates the anatomy of a latent grapevine bud and the early stages of its development. Typically, sap bleeding precedes budburst, although in certain cases budburst may occur without any visible sap flow at the ends of pruned canes.

Key Takeaways

Understanding dormancy and budburst dynamics (budbreak conditions will be addressed in another post) allows for the selection of appropriate management strategies—such as optimizing pruning time to delay budbreak and minimize the risk of spring frost damage from the onset of bud development. Additional frost protection methods will be discussed in a subsequent post.

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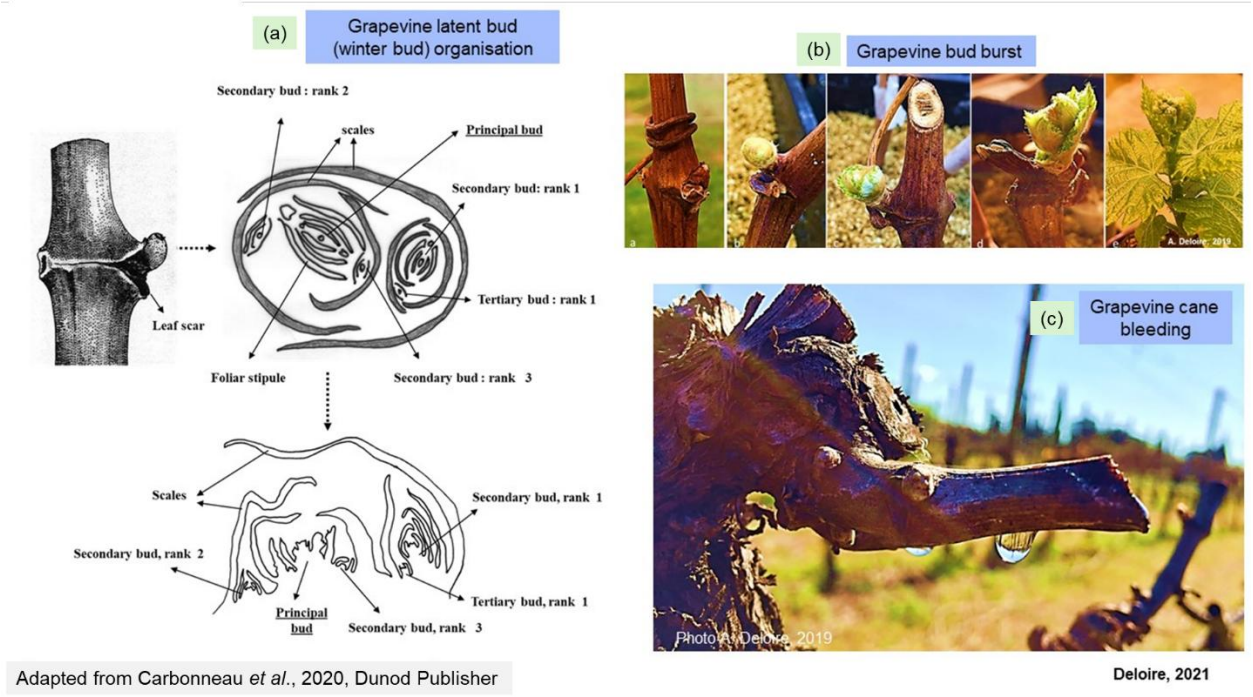

Figure 1: (a) Example of grapevine latent bud anatomy; (b) early stages of grapevine budbreak; (c) grapevine cane bleeding.

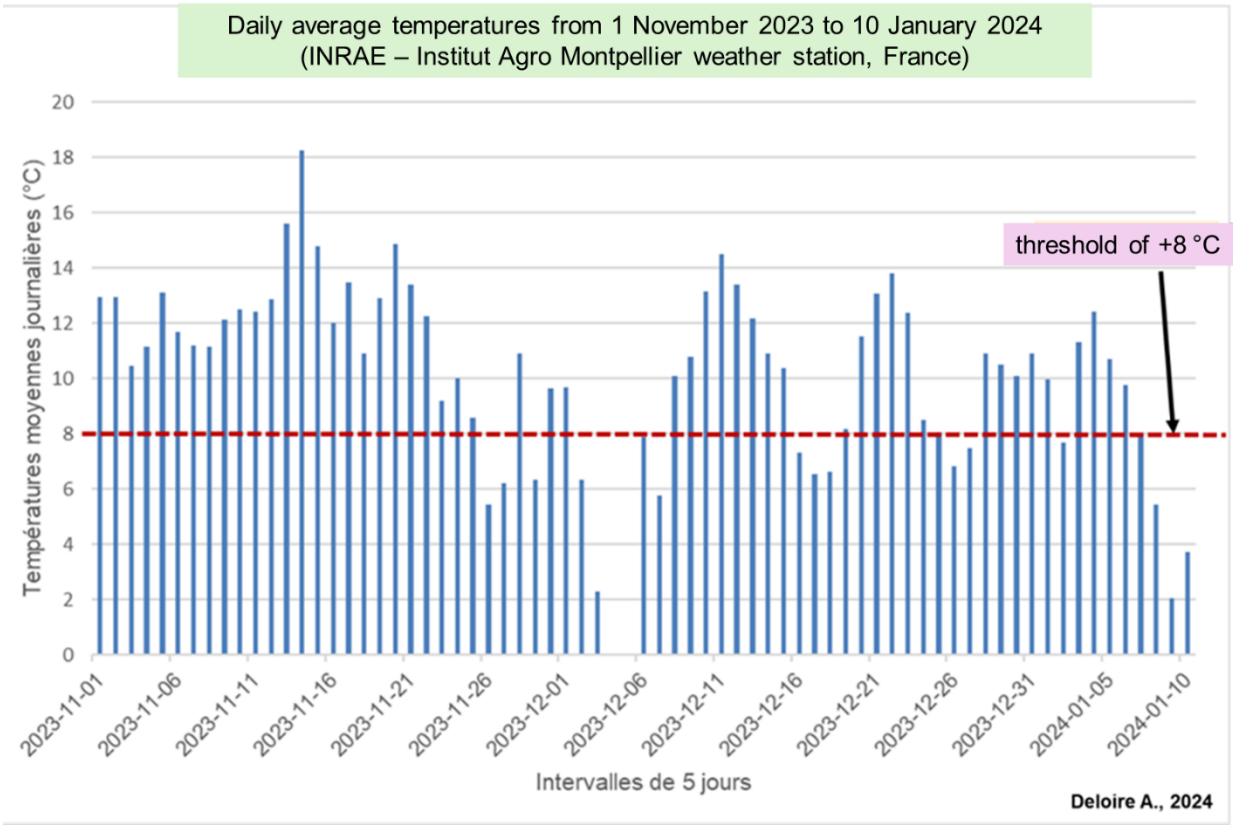

Figure 2: Example of daily winter average temperatures used to determine whether endodormancy has been released.