

GRAPEVINE

HYDRIC STRESS IMPACT



TIMAC AGRO ADVICE KIT



HOW TO MANAGE HYDRIC STRESS THROUGHOUT THE YEARS ?

The management of water in vine crop is known to have the greatest influence on vine physiology (yield, plant vigour, grape quality potential). It is also the hardest to measure, forecast and manage especially due to climate change and abiotic stresses impacts. Evaluating grapevine hydric state will determine if its not limiting, weakly limiting or if the vine is under real water stress. Watering will not be enough to overcome the damages made by a severe stress. Specific cultural practices will help the grower to obtain a fair compromise between the yield and the qualitative potential of the grapes.

1l of wine = 400l

of water during vegetative growth

Source : Viti les enjeux, 2019

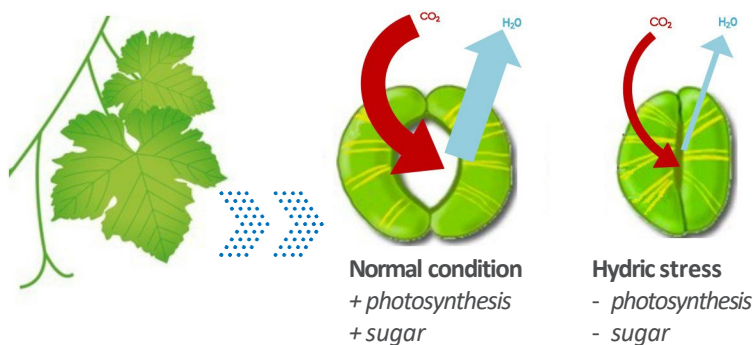
1 TIMAC AGRO INSIGHT

Thanks to its root exploring capacity grapevine can tolerate a certain level of hydric constraint. It is up to the grower to fix the maximum threshold not to exceed according to its production target (yield, quality, sugar etc.) Hydric stress can be light to moderate for white wine and moderate to strong for red long-keeping wine (IFV Colloque 2014). However, it is well known that not only drought intensity has an impact on grapevine but also the stage occurrence and the length influences the final berries weight and hence their composition and yield (Zufferey et al. 2020).

What is the physiological impact of hydric stress on grapevine?

First response to drought is stomatal closure (Düring 1987), which will lead to a decrease of gaseous exchange (Figure 1) (photosynthesis and transpiration) causing early vegetative growth stop (Chaves et al. 2010).

Figure 1. Plant physiological reaction to hydric stress at leaf scale

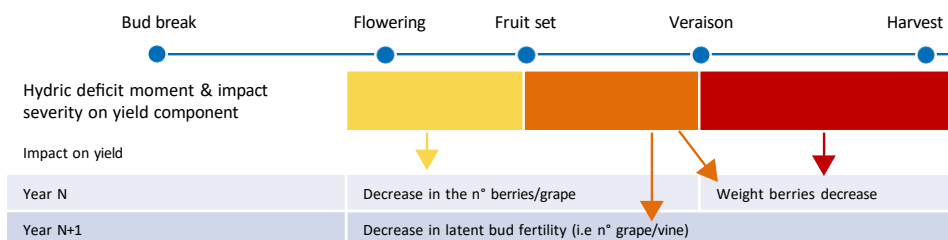


The decrease of photosynthesis activity results in less sugar production which means a reduction of sugar exportations in sink organs such as berries, roots or latent buds. In the end it can be problematic for wine maturation or reserve building.

Negative impacts on growth and vegetative development during the ongoing season will influence negatively on the grapevine carbohydrate production which represent important source of energy for sustainable production.

The stage of hydric stress occurrence will impact differently the grapevine yield. Severe water lacking before flowering can indirectly reduce number of berries/grape due to photosynthesis decrease.

According to literature severe pre-veraison hydric deficit will reduce the ongoing season berries weight, and the number of grape/vine stock of the following season.



This is due to the impact on the differentiation of primordia inflorescence in the latent bud. Hydric stress impacts yield and quality year N and also year N+1.

Source : IVES Technical Reviews August 2020



2 TIMAC AGRO SOLUTIONS

TIMAC AGRO technology SEACTIV found in FERTILEADER is recommended to manage hydric stress:



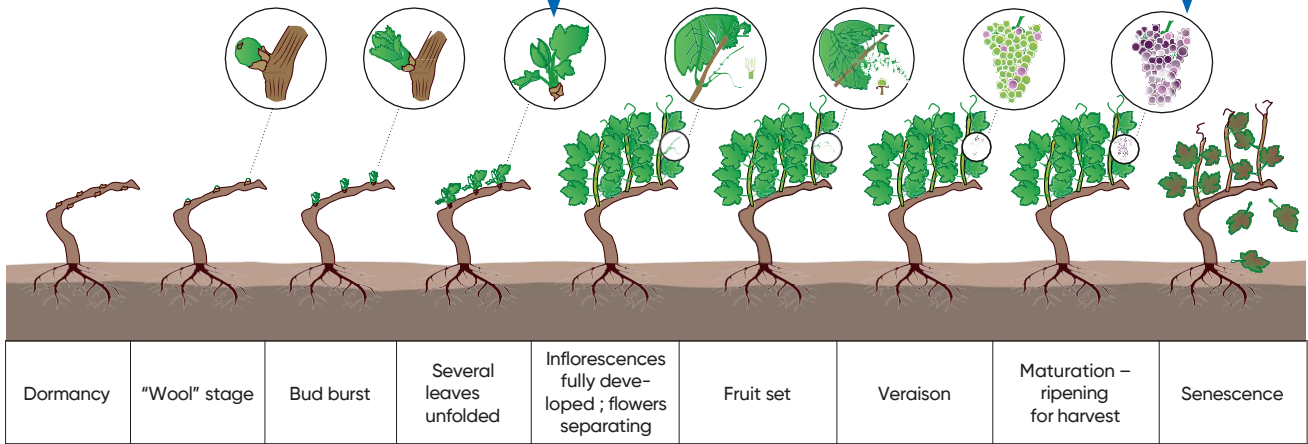
- Stimulation of photosynthesis
- Improvement of crop tolerance to abiotic stress Increase of nutrient
- Increased nutrient uptake by the plant



RECOMMENDATIONS



Application Rate:
1.2L/ac per treatment 2-4 treatments
=> 2x Fertileader Gold, 2x Fertileader Vital



During flowering stage, prefer SEACTIV technology with boron – FERTILEADER GOLD.
From fruit set to harvest, prefer SEACTIV technology with trace – FERTILEADER VITAL.

ZOOM ON TRIALS

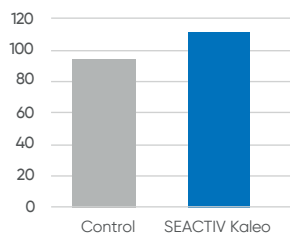


- Plantation: 2004
- Year Trial : 2019
- Grape variety : Syrah
- Condition : extreme climate conditions

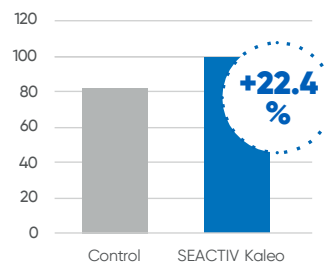
- Thermic stress in June and July
- Hydric stress from July until after harvest



Average number of berries/grape (4 repetitions average)



Estimated yield (hL/ha) (4 repetitions average)



Even after thermic and hydric stress SEACTIV helps the plant to manage the stresses undergone throughout its growth and secures or even increases yield.

GOOD TO KNOW...

Leaf or stem water potential can be measured thanks to a pressure chamber and will determine grapevine water status. Below are some indicative thresholds of the pre-dawn leaf water potential (PLWP) which represents the balance between the hydric state of the vine and the hydric state of the soil.

- 0,2 MPa < PLWP absence of hydric constraint
- 0,3 MPa < PLWP < - 0,2 Mpa low hydric constraint
- 0,5 MPa < PLWP < -0,3 MPa low to moderate hydric constraint
- 0,8 MPa < PLWP < -0,5 MPa moderate to severe hydric constraint
- PLWP < -0,8 MPa severe hydric constraint

Attention these values are indicative and can vary according to rootstock

This potential is measured at dawn with constant climate conditions.