

# Garlic and H<sub>2</sub>O<sub>2</sub> in overcoming dormancy on the vine “Cabernet Sauvignon”

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**Abstract.** The objective of this experiment was to evaluate the effect of garlic extract, H<sub>2</sub>O<sub>2</sub> and hydrogen cyanamide on dormancy break, budding and maturation of “Cabernet Sauvignon” in the Campaign Region – Brazil. In late winter 2014 and after drought pruning were performed spraying in the bud: T1 – distilled water (control); T2 – 3.0% of hydrogen cyanamide; T3 – 18.0% H<sub>2</sub>O<sub>2</sub>; and T4 – 3.0% garlic extract. It was evaluated in the field: the number of sprouted buds per plant, number of bunches per plant and weight of bunches per plant; and laboratory: on ripening, performed weekly from the color change of 360 berries per treatment for analyzes solids soluble – SS (Brix) pH and titratable acidity – TA (% tartaric acid). It was observed that the vines of treatment T4 (3.0% garlic extract), showed higher percentage of buds sprouting (63 shoots plant<sup>-1</sup>). Already at the number of clusters and weight per plant, there were no statistical differences between all treatments. The results obtained in the laboratory to SS, pH and TA did not differ statistically for the four tested treatments.

## 1. Introduction

Once dormancy is induced, it is maintained by unknown mechanisms [1]. The period of dormancy is integral to the survival of the vine in areas where winter temperatures fall below 0°C, although dormancy is also an important part of the vine cycle in warmer areas of Brazil, too [2].

The vine *Vitis vinifera* “Cabernet Sauvignon” comes from Bordeaux, south-western France (natural hybrid between “Cabernet Franc” and “Sauvignon Blanc” [3]. It is one of the more grapes planted in the world, the production of quality wine in several countries. In Brazil produces fine red wine best conditions for aging. He had a great expansion from 1970 begins to decline recently. However, it remains the largest area of ink *Vinifera* in Brazil [4]. The “Cabernet Sauvignon” latency issues can occur when the winter is mild or when the vineyard is located in the regions with the number of chill hours below 10°C [5]. The mild fruit characterized by dropping their leaves at the end of the cycle going dormant in winter, reducing their metabolic activities, which need to be exposed to a period of low temperatures to start a new cycle in the spring [6].

Latency deciduous plants such as internal factors involve balancing promoters and growth inhibitors, or external, such as temperature, photoperiod and solar radiation, among others. Of external factors, which most stands out is the temperature, and when the plants are grown in areas with shortages of winter cold, symptoms of mismatches are the delay and the longer period of bloom and the lower opening of flowering and vegetative buds, resulting in lower production, with uneven and low quality fruits [7].

In regions where no dormancy is overcome by the cold of winter, or the varieties used have a chilling hour’s requirement, there is the need to use chemicals to break dormancy [8]. Several products are effective in overcoming latency, such as mineral oil, hydrogen cyanamide, calcium cyanamide and Thidiazuron. With mineral oil and recommended as one of the most effective ways to induce fruit leaf buds hydrogen cyanamide expires in Brazil as the vine [9].

The effect of hydrogen cyanamide, however, varies depending on various factors such as the concentration, time and mode of application, weather conditions and growing [10]. Overall, the increase in the percentage of sprouted buds leads to greater productivity and better training for the branches to be pruned the following year [11]. The use of this growth regulator also produces an advance of the date of the harvest, about 15–20 days, due to the higher concentration of sugars in the berries, due to the earlier onset of leaf development [12].

Despite its current use in various parts of the world, little is known about the mode of action of this substance in break dormancy. Furthermore, the substance has a high toxicity [13].

The objective of this experiment was to evaluate the effect of hydrogen cyanamide, hydrogen peroxide and garlic extract to overcome latency, budding and ripening cultivar “Cabernet Sauvignon” in “Campanha Gaucha” – Brazil.

## 2. Materials and methods

The research was conducted in the vineyard of “Cabernet Sauvignon” clone R5 and rootstock “SO4”, planted in 2000, based on a trellis and driven in cord Royat, on private property in the municipality of Dom Pedrito – RS – Brazil.

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The experimental design was a randomized block design with four replicates each with five floors for a total of twenty plants per treatment. In late winter 2014, after spraying the dry pruning gems were performed: T1 – water distilled (control); T2 – 3.0% of hydrogen cyanamide; T3 – 18.0% hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>); and T4 – 3.0% extract of garlic.

It was evaluated in the field: the number of sprouted buds per plant, number of bunches per plant and weight of bunches per plant.

On ripening, performed weekly from the color change of 360 berries per treatment for analyzes in laboratory: the soluble solids concentration – SSC was determined by direct reading of grape juice in a digital refractometer (Atago PR-101, Atago Co. Ltd., Tokyo, Japan), with the results expressed in °Brix. Titratable acidity (TA) was determined from 10 g of grape juice diluted with 90 mL of water, titrated with 0.1N NaOH to pH 8.1 and expressed in percentage of tartaric acid, once this acid represents approximately 80% of the total organic acids present in grape; pH was determined with potentiometer.

The data were subjected to analysis of variance and the least significant differences were calculated using SAS software for the randomized block design with four replicates each with five floors for a total of twenty plants per treatment. Differences between any two treatments greater than the sum of two standard deviations were always significant ( $P > 0.05$ ).

### 3. Results and discussion

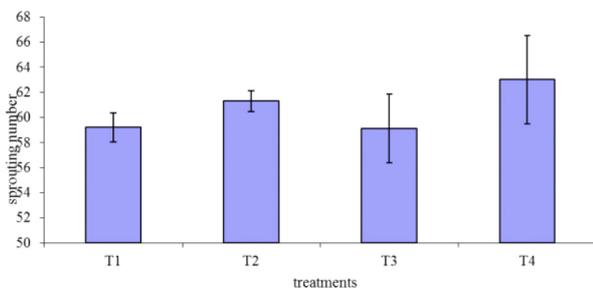
It was observed that the vines of treatment T4 (3.0% garlic extract), showed higher percentage of buds sprouting (63 shoots plant<sup>-1</sup>) (Fig. 1).

The use of endodormancy-releasing chemicals is limited to instances where insufficient natural chilling occurs for adequate bud break and crop production [1], who is the case of the region where executed this project.

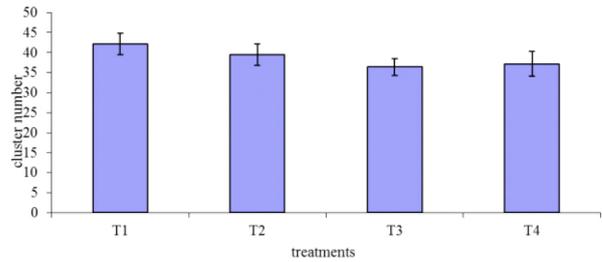
Already at the number of clusters and weight per plant, there were no statistical differences between all treatments (Figs. 2 and 3).

The results obtained in the laboratory to SS, pH and TA did not differ statistically for the four tested treatments.

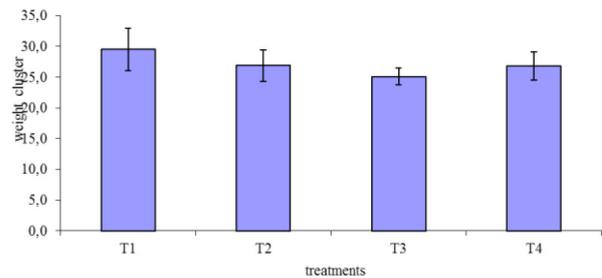
The “Cabernet Sauvignon”, synonymous with serious red wine capable of ageing into subtle splendour. For this reason “Cabernet Sauvignon” is also the best-travelled red



**Figure 1.** Sprouting percentage grape “Cabernet Sauvignon”. T1 – distilled water (control); T2 – 3.0% of hydrogen cyanamide; T3 – 18.0% and hydrogen peroxide; T4 – 3.0% extract of garlic. Vertical bars represent ± S.D. ( $n = 20$ ).



**Figure 2.** Number of clusters per plant grape “Cabernet Sauvignon”. T1 – distilled water (control); T2 – 3.0% of hydrogen cyanamide; T3 – 18.0% and hydrogen peroxide; T4 – 3.0% extract of garlic. Vertical bars represent ±S.D. ( $n = 20$ ).



**Figure 3.** Weight of clusters per plant grape “Cabernet Sauvignon”. T1 – distilled water (control); T2 – 3.0% of hydrogen cyanamide; T3 – 18.0% and hydrogen peroxide; T4 – 3.0% extract of garlic. Vertical bars represent ±S.D. ( $n = 20$ ).

wine variety, but since it is a relatively late ripener it is viable only in warmish climates [14].

### 4. Conclusions

The plants that received a dose of 3.0% garlic extract presented the highest percentage of sprouted buds. For analysis of maturation, the presence of hydrogen cyanamide, hydrogen peroxide, such as garlic extract did not influence the quality of the grapes “Cabernet Sauvignon”.

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