Efficiency of Cromaliv in cherry

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Introduction
CROMALIV® is a new biostimulant developed by Futureco Bioscience to enhance the colour of the fruit in crops in which this factor is key to the acceptance of the product in the market.

With the intention of proving its effectiveness, a field trial has been carried out in cherry trees, whose fruit is very appreciated by the consumer and in which the colour of their skin represents a determining parameter of quality.

Materials and Methods
The trials were conducted in Torrefarrera (Lleida, Spain), from April to June 2018, using a total of 120 trees of Prunus avium var. Cristalina. Two doses and moments of application of CROMALIV® were evaluated against a reference product and an untreated control (Table 1). Each experimental condition consisted of 4 replicas of 6 trees / replica.

The first application was made just before the start of fruit colouring, when the cherries showed straw colour, or S3 stage \(^1\). The second application was made on fruits already with red coloration.

At the time of harvest, both the diameter and the weight of the fruits from each of the treatments were evaluated. The determination of the degree of physiological maturity was evaluated with ethylene production and the respiratory rate (CO\(_2\) production) at the time of harvest.

The effect on the colouring of the skin of the fruit was analysed through the use of colour charts of the "Centre technique au service of the filière fruits et legumes" (CTIFL, France) and through the use of a spectrophotometer (Minolta 2600D) to assess more objectively the colour variations caused by the treatments.

The state of maturity of the fruit was determined based on the differential absorbance index (DAI), obtained with a DA-meter. In turn, the total soluble solids content (º Brix) and the acidity (assessment with 0.1N NaOH) of the juice extracted from 10 fruits per replica were also determined.

Table 1 Treatments applied in cherry field trials.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Doses</th>
<th>Application 1</th>
<th>Application 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>NT</td>
<td>NT</td>
<td>NT</td>
</tr>
<tr>
<td>Reference Product</td>
<td>0.6g/L @</td>
<td>@</td>
<td>@</td>
</tr>
<tr>
<td>Cromaliv®</td>
<td>0,1% @</td>
<td>@</td>
<td>@</td>
</tr>
<tr>
<td></td>
<td>0,2% @</td>
<td>@</td>
<td>NT</td>
</tr>
<tr>
<td></td>
<td>0,2% @</td>
<td>@</td>
<td>@</td>
</tr>
</tbody>
</table>

NT: Not treated. @: Treated.

Results and Discussion
The size and weight of the fruit was not altered by the application of any of the treatments evaluated (Figure 1).

Figure 1. Diameter (mm) and weight (g) of the cherries at harvest time.

Similarly, the treatments did not exert a clear effect on the physiology of the fruit either, because neither the respiratory rate nor the ethylene production were significantly altered (Fig. 2).

Cromaliv is a biostimulant activator of the colouring of fruits such as table grapes, cherries, blueberries, red fruits and plums, among others. Its composition promotes the metabolic pathways that specifically activate the synthesis of pigments responsible for colour. In addition, Cromaliv improves the organoleptic conditions of these fruits, resulting in a product of higher quality and more attractive for sale and consumption.

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Figure 2. Ethylene production (bars) and respiration (squares) in harvested cherries.

The content of soluble total solids and acidity of the juice from the fruits was not modified in response to the treatments applied (Fig. 3).

Figure 3. Content in total soluble solids (white) and acidity (black) of the juice of the harvested fruits.

In contrast, the repeated treatment with CROMALIV® at the highest dose caused a significant increase in the absorbance difference index (Fig. 4), which is related to the "chlorophyll a" content of the fruit mesocarp [2] and therefore, it can be interpreted as a reflection of the degree of ripeness of the analysed fruit, since the maturation process implies the previous degradation of chlorophylls [3].

Figure 4. Index of Absorbance Difference (I_{AD}) for the determination of the degree of ripeness of the cherry.

In the same sense, the analysis with the spectrophotometer showed that treatment with 0.2% CROMALIV® (regardless of the number of applications) implied a significant reduction of the Hue angle value (ºh), which determines the colour analysed. Thus, the fruits treated with CROMALIV® at the highest dose showed a greater colour intensity than the untreated fruits (Control), similar to that achieved with the reference product (Fig. 6).

Figure 5. Classification of the fruits evaluated according to the colour charts used.

Figure 6. Colour determination by spectrophotometry to obtain the ºh value.

Conclusions

The application of CROMALIV® allows to increase the intensity of the colouring of the fruit without accelerating the process of cherry maturation and, therefore, without negatively affecting the quality of the fruit.

References

