The Romans used heat to produce concentrated (sapa and defrutum) for sweetening wines

Pinot (c. AD 80) and other agricultural authors of the era recommended this be done in lead vessels. Some researchers have suggested that lead poisoning contributed to the demise of the Roman empire (a theory refuted by others).

Heating whole grapes by immersion in Burgundy

In Burgundy in the 1920s, researchers studied immersing whole grapes in hot juice for 4-5 minutes then draining and leaving the grapes for 12-24 hours. During this time the colour from the skins would diffuse into the juice. Crushing, destemming, pressing and liquid fermented followed.

Flash détente

Thermovinified wines (minimal maceration period) lack structure and colour stability because of a lack of tannins. Flash détente (patented by INRA in 1993) exposes heated grapes to a vacuum so that a portion of liquid boils immediately (if flashes) from inside the skin cells. This increases the extractability of tannins and polyphenols. It instantaneously cools the grapes and allows removal of pyrazines in the condensate that may fine out anthocyanins. Rotary drum vacuum (RDV) filtration provided a thorough clarification that minimised the latter effect. This extreme clarification tended to lead to very fruity estery red wines. Later, with the adoption of longer periods of pre-fermentation maceration and post-heating techniques like flash détente that extracted more tannin and stabilised colour, such strict clarification could be relaxed to modulate sensory profile if desired.

Modulated flash détente

In this variation on flash détente patented INRA and Para-Pellel in 2011, a slightly weaker vacuum is used that only cools the grapes to 55°C instead of 30°C. Enzymes are added to assist extraction and are near their optimum activity at this temperature. A bit can be achieved with a short contact time. This step can be performed while filling a large membrane press.

California investigates heat extraction

In the early 20th century heat extraction was investigated in California. Grapes were crushed, destemmed and drained with the juice being heated by steam in the device shown and added back into the tank with the skins. After sufficient contact time for colour extraction, juice was drained, cooled and the liquid fermented.

Hot colour extraction to stop adulation of wines with synthetic dyes

In the 1930s there were issues in Burgundy with the adulation of wines with fuchsin (a synthetic aniline dye). Hot maceration was proposed as one natural alternative means to enhance colour.

Industrial scale continuous immersion

One of the industrial scale thermovinification systems developed in the 1970s was the INECA continuous system. A portion of pre-drained juice was heated and sprayed on the grape solids. This hot juice loop was re-heated and re-circulated.

Modern continuous immersion

The modern immersion processes are more gentle. In this design from Peru-Pellel, the incoming grapes are drained by a rotary screen. They are then heated as they are conveyed in a hot juice bath before passing over a hot juice separating rotary screen as they exit.

Australian interest in thermovinification in the 1970s

This is the 16th Australian Wine Industry Technical Conference. At the 2nd Wine Industry Technical Conference in 1972, there were two papers by industry technical leaders on their experiences with thermovinification. In the same year, Bigot Régnier wrote on the use of the thermovinification in wines, and later in the Wine Institute magazine.

Heat Extraction of Color From Red Grapes

*Of Increasing Importance

**Heat Treatment for Red Grapes**

Thermo vinification

1. **Pre-fermentation**
2. **Hot maceration**
3. **Post-fermentation**
4. **Clarity**

**Advantages**

- **Thicker wines**
- **Wine rich in tannin**
- **Production of wine with high color density**
- **Red wines created in the manner of whites**

**Disadvantages**

- **Inferior wines**
- **Wines without tannin**
- **Wines where there is an excess of tannins**

**Operating conditions**

- **Maceration parameters**
- **Temperature**
- **Pressure**
- **Duration**

**Pre-fermentation**

- **Temperature**
- **Time**

**Post-fermentation**

- **Temperature**
- **Time**

**Clarity**

- **Temperature**
- **Time**

**Rationale**

- **To obtain tannins**
- **To obtain color**
- **To obtain flavors**

**Influence of heating on wine style**

<table>
<thead>
<tr>
<th>Defence</th>
<th>Acidity</th>
<th>Palate</th>
<th>Compatibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermovinification</td>
<td>Fresh fruit</td>
<td>Light</td>
<td>Suitable for grapes with high or low potential</td>
</tr>
<tr>
<td>Pressurisation</td>
<td>Dark fruit</td>
<td>Sweet</td>
<td>Suitable for grapes with low potential</td>
</tr>
<tr>
<td>Low pressure</td>
<td>Green</td>
<td>Balanced</td>
<td>Suitable for grapes with high potential</td>
</tr>
<tr>
<td>High pressure</td>
<td>Red</td>
<td>Balanced</td>
<td>Suitable for grapes with low potential</td>
</tr>
</tbody>
</table>

Equipment evolution: Heating for rapid skin extraction in red wine production

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