



JORNADA DE TRABAJO PTV  
“LA VIDA UTIL DE LOS VINOS ESPAÑOLES EN EL MARCO DE  
COMERCIALIZACIÓN ACTUAL”

# Técnicas emergentes para el control de microorganismos

Antonio Morata Barrado  
[antonio.morata@upm.es](mailto:antonio.morata@upm.es)



# Técnicas emergentes para el control de microorganismos

## Retos

- Sanitización de la uva
  - Ausencia de sanitización de la uva en enología
  - Levaduras 104-106 cfu/ml mosto
  - Bacterias 104 cfu/ml
  - Implantación de starters
  
- Control/Reducción de los niveles de SO<sub>2</sub>
  - Alérgeno
  - Vinos ecológicos
  - Efectos sensoriales
  
  - Reductor (mayor extracción)
  - Antimicrobiano

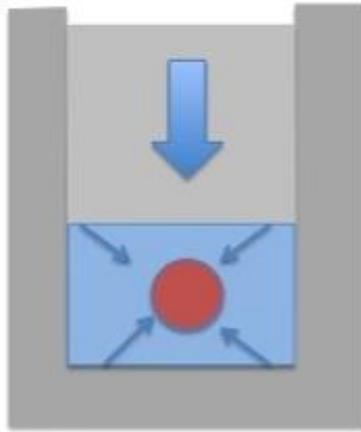


# Técnicas emergentes para el control de microorganismos

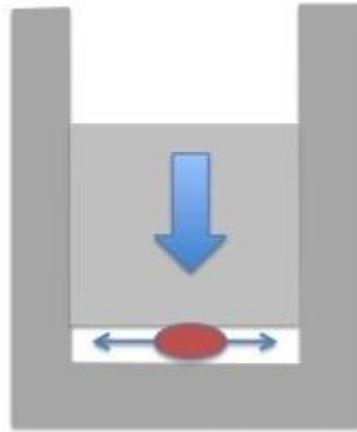
- **Altas presiones**
- **Campos eléctricos pulsados**
- **Irradiación**
- **Luz UV**
- **Luz pulsada**
- **Ultrasonidos**



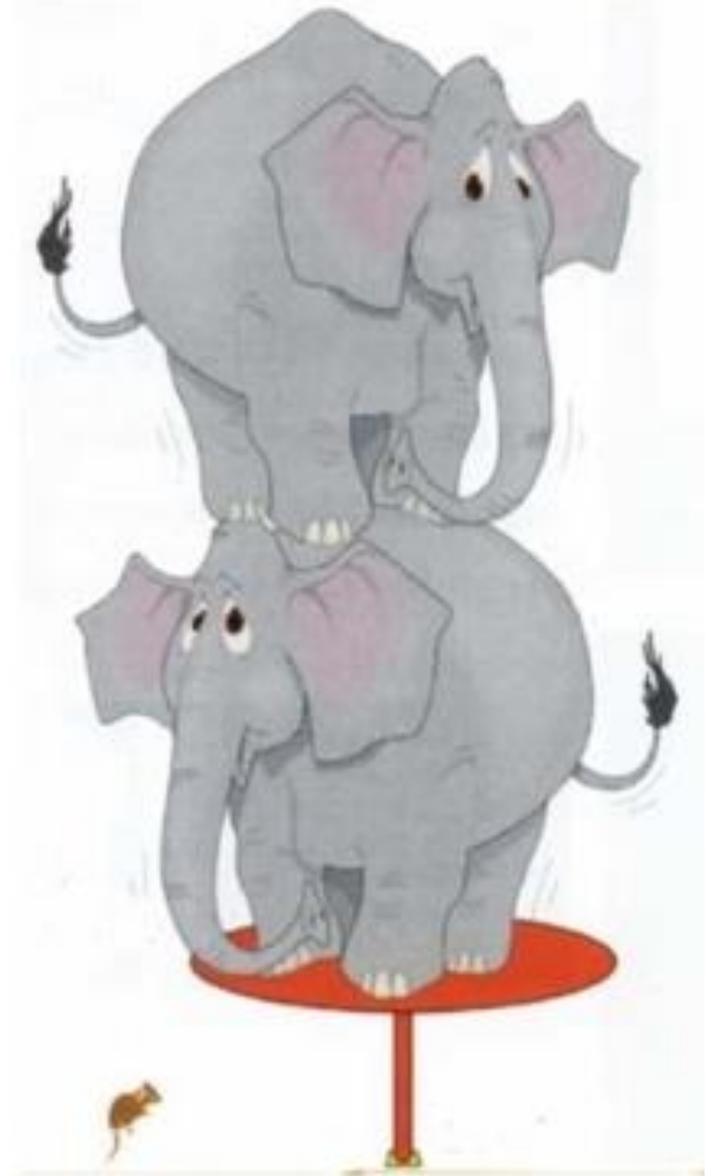
# Altas presiones. HHP



Presión hidrostática

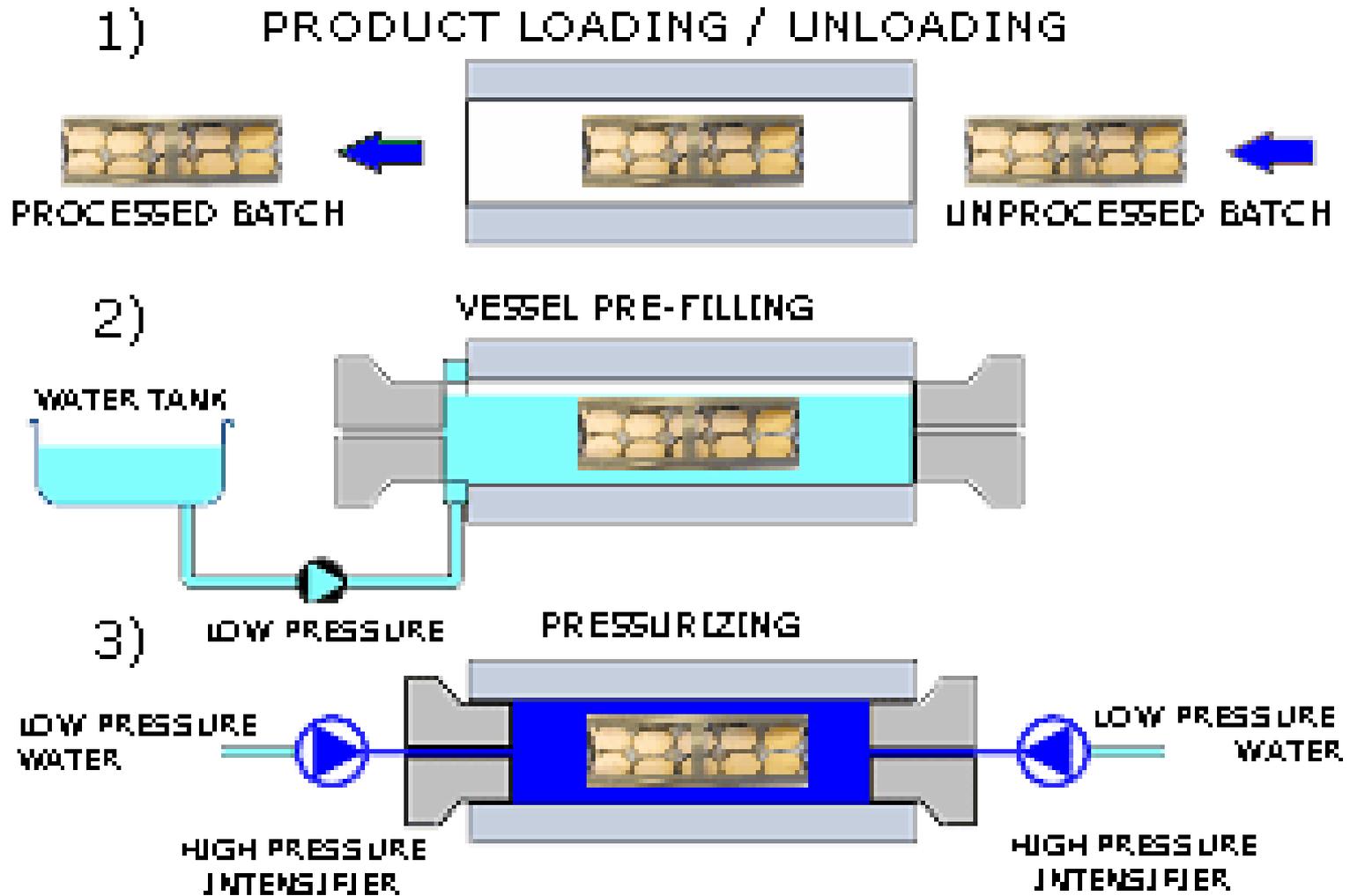


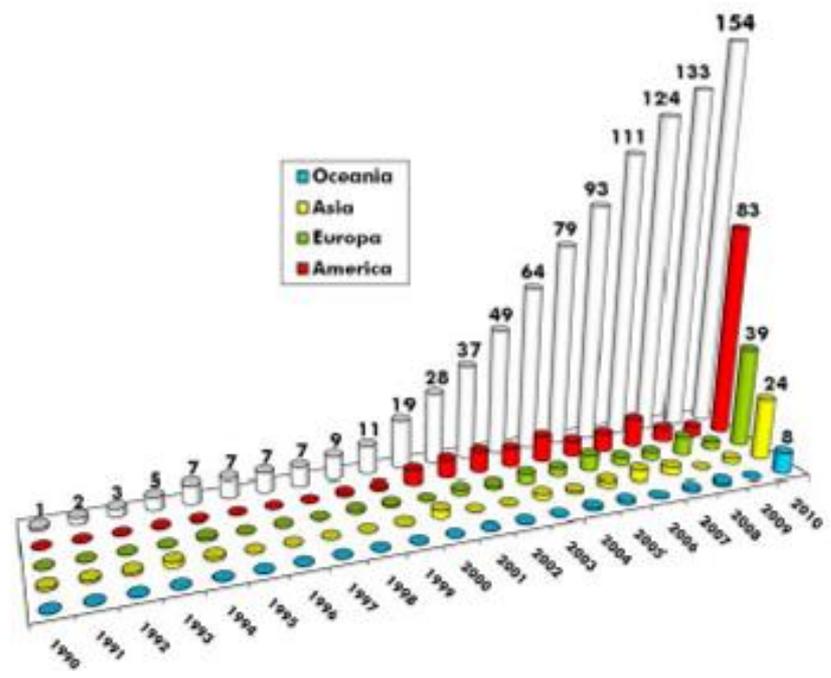
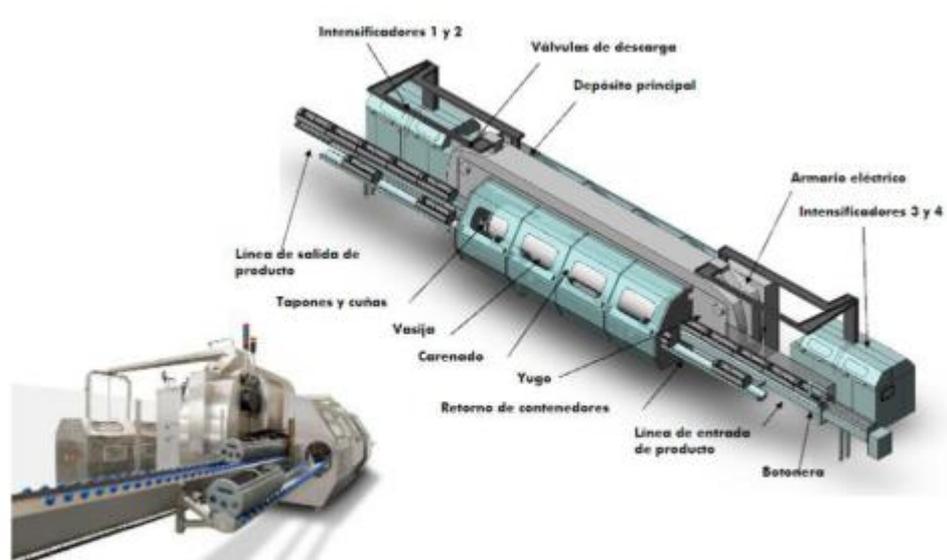
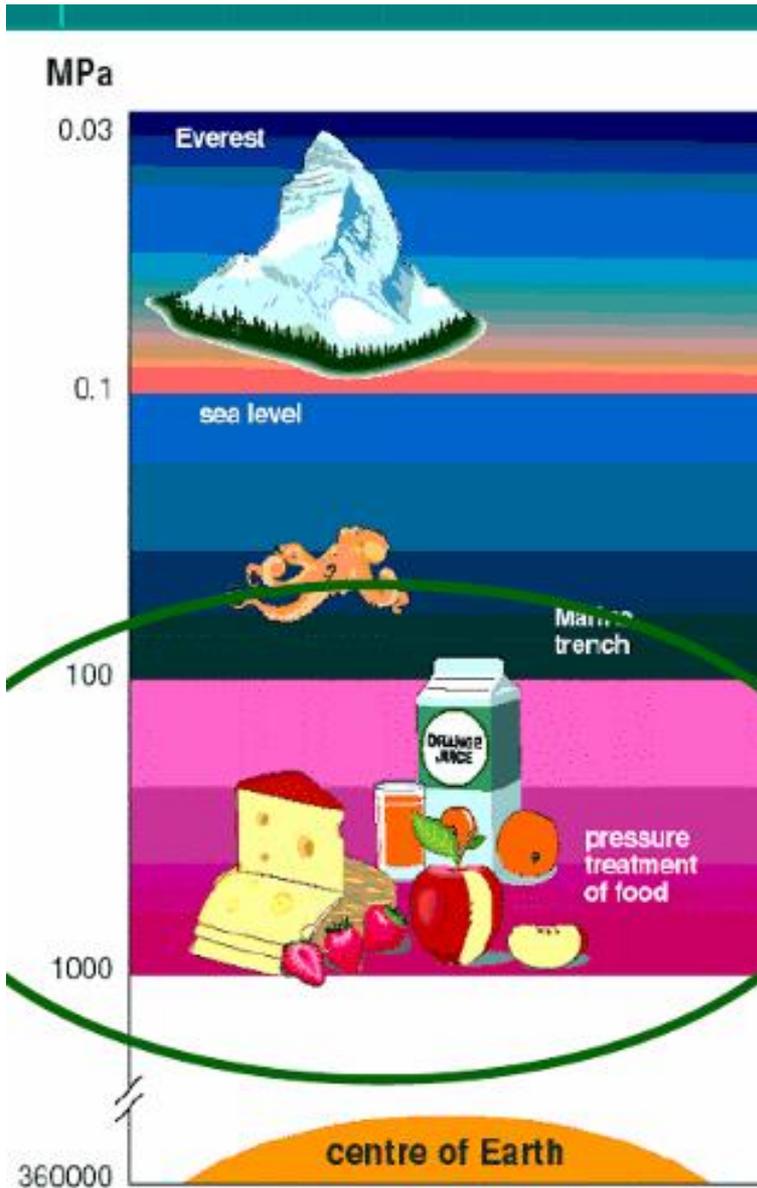
Presión unidireccional

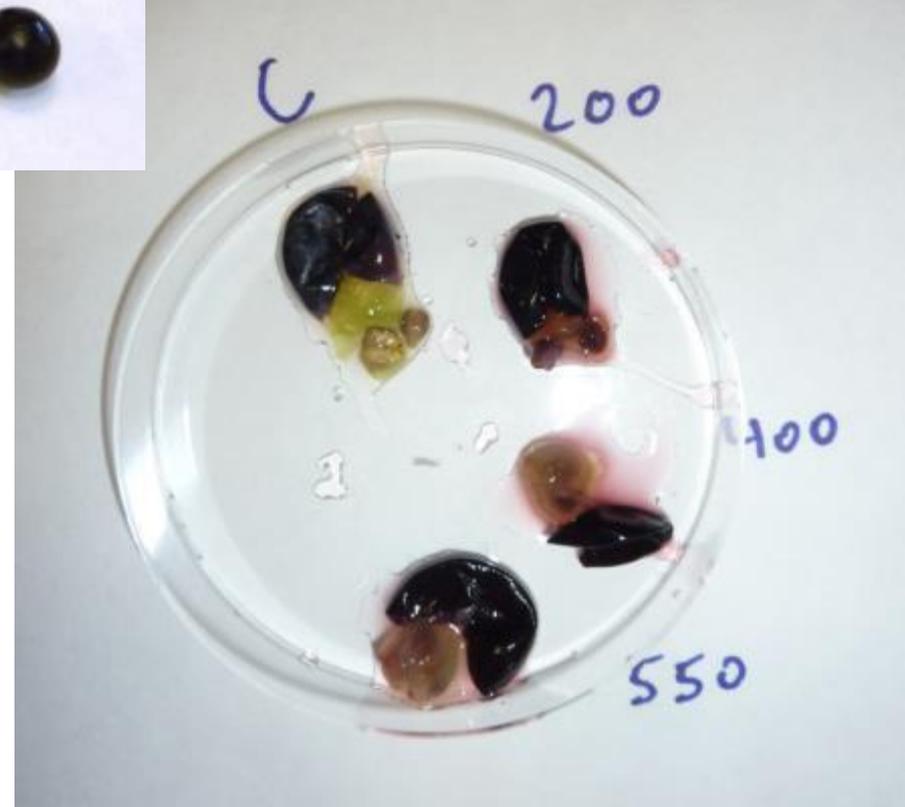
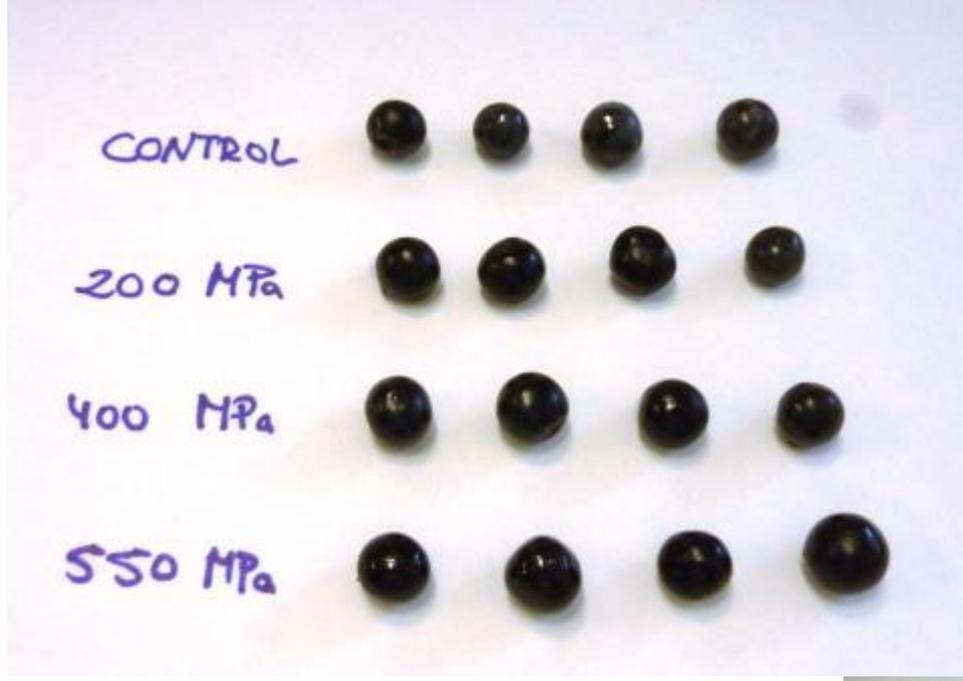


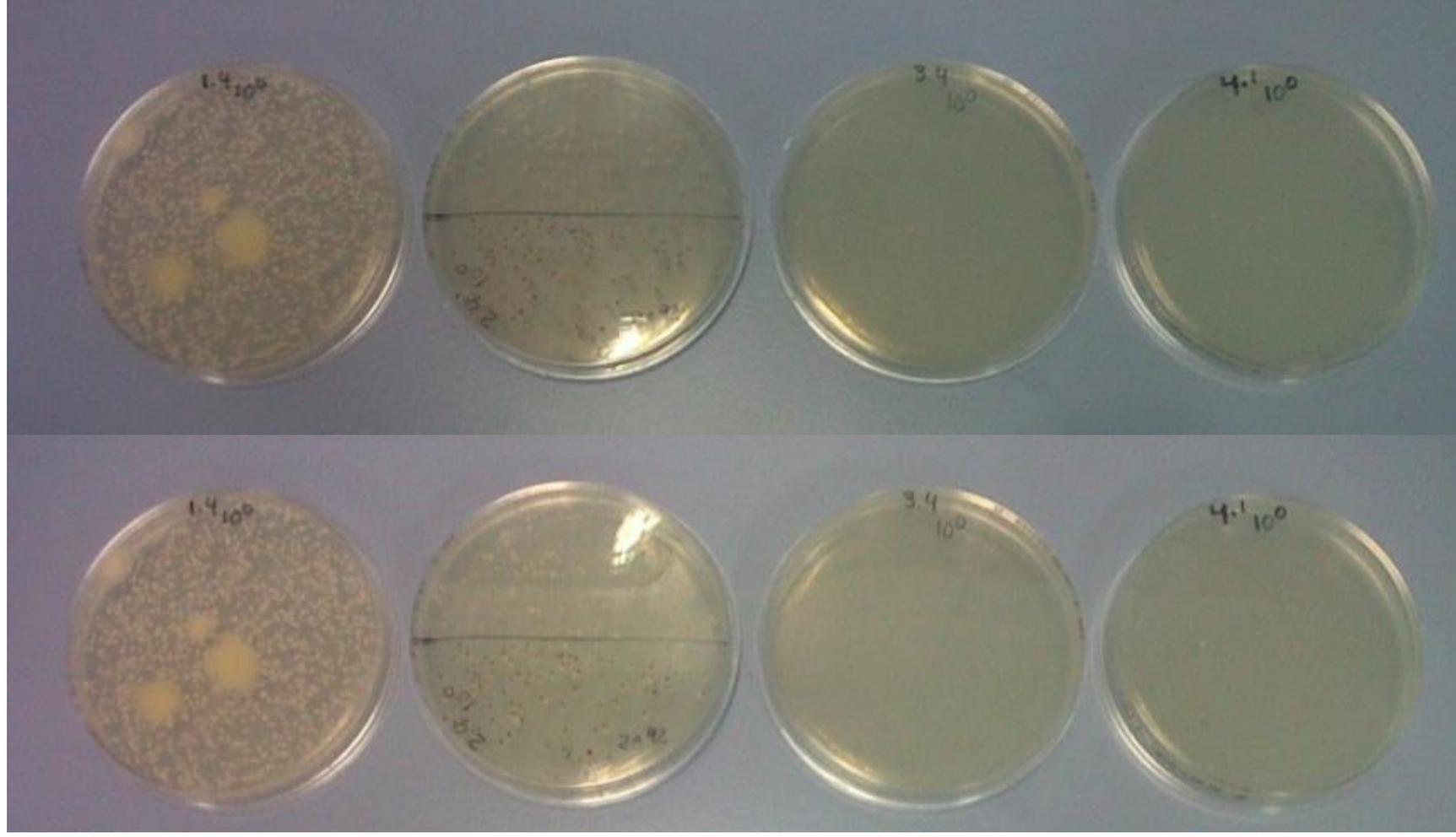
- Tecnología no térmica











**Table 1** Growth and 4-ethylphenol content of the differently prepared and treated wines

Treatment (performed in triplicate)	Population size (cfu mL <sup>-1</sup> )	pH	Pressure (MPa; 24 h)	Growth (cfu mL <sup>-1</sup> after 30 days on DBDM medium)	4-ethylphenol production (µg L <sup>-1</sup> )
3.2 C	–	3.2	–	–	0.0 ± 0.0
3.6 C	–	3.6	–	–	0.0 ± 0.0
3.2 C 10 <sup>6</sup> DB	10 <sup>6</sup>	3.2	–	>10 <sup>4</sup>	405.0 ± 110.0
3.6 C 10 <sup>6</sup> DB	10 <sup>6</sup>	3.6	–	>10 <sup>4</sup>	682.0 ± 55.0
3.2 10 <sup>6</sup> DB	10 <sup>6</sup>	3.2	100	–	0.0 ± 0.0
3.6 10 <sup>6</sup> DB	10 <sup>6</sup>	3.6	100	–	0.0 ± 0.0
3.2 10 <sup>4</sup> DB	10 <sup>4</sup>	3.2	100	–	0.0 ± 0.0
3.6 10 <sup>4</sup> DB	10 <sup>4</sup>	3.6	100	–	0.0 ± 0.0

Values for 4-ethylphenols are means ± SD for three replicates. C control, DB contaminated with *D. bruxellensis* D37

# Campos eléctricos pulsados. PEF/CEP

no térmica: 2-3 °C

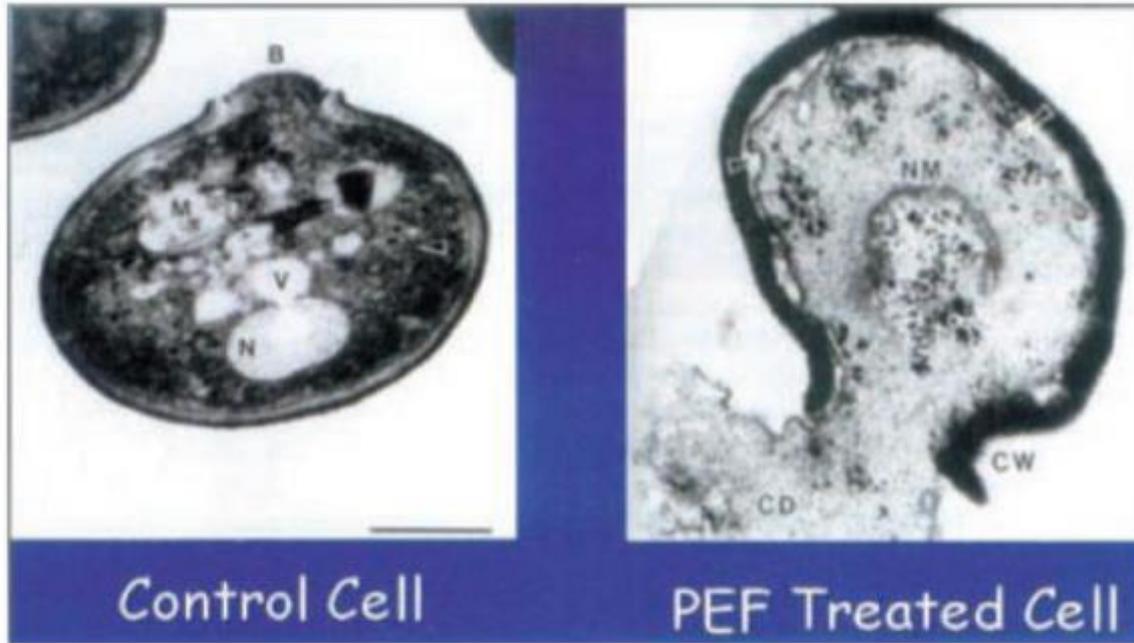
5-20 kW

40-0 A

Proceso continuo



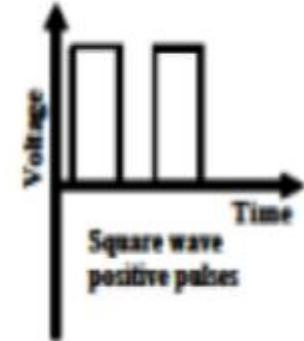
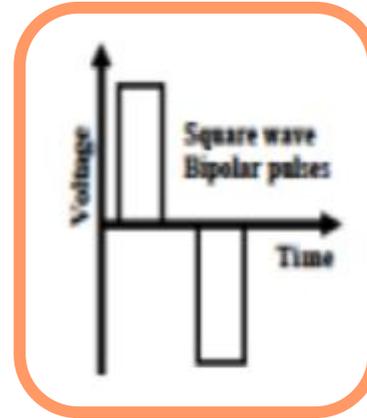
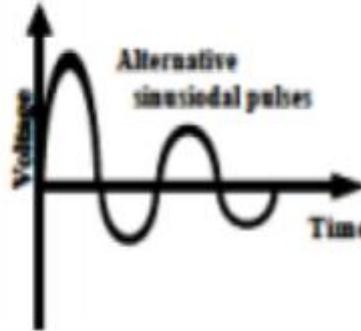
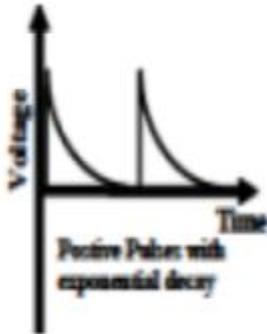
# Campos eléctricos pulsados. PEF/CEP



Picture 1 - Comparing a reference cell (*Saccharomyces cerevisiae*) with a PEF-treated cell, showing the damage to the cell membrane.

Source: Washington State University, Harrison et al 1996

# Campos eléctricos pulsados. PEF/CEP



# Campos eléctricos pulsados. PEF/CEP

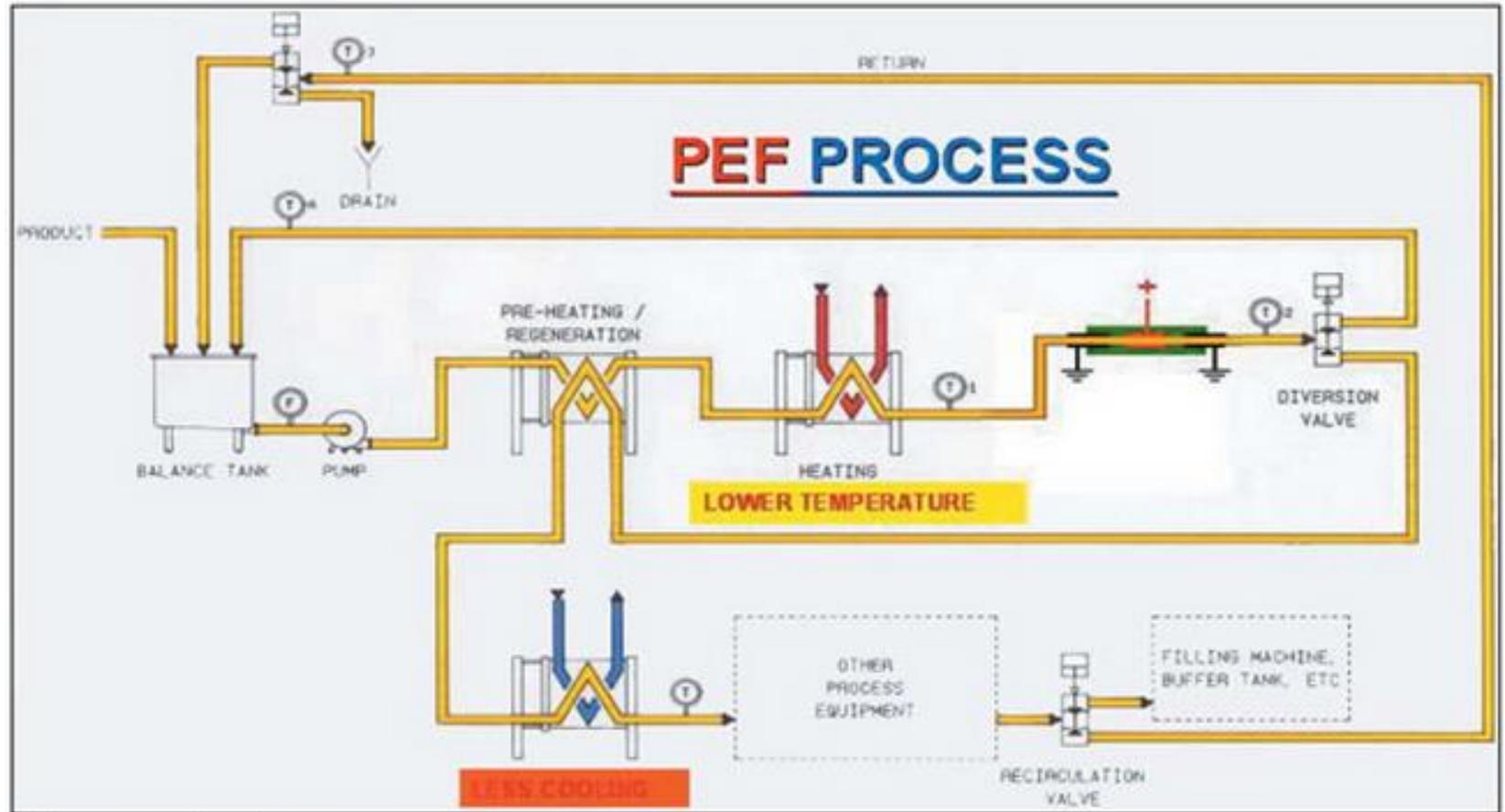


Figure 1. The PEF process.

## PEF



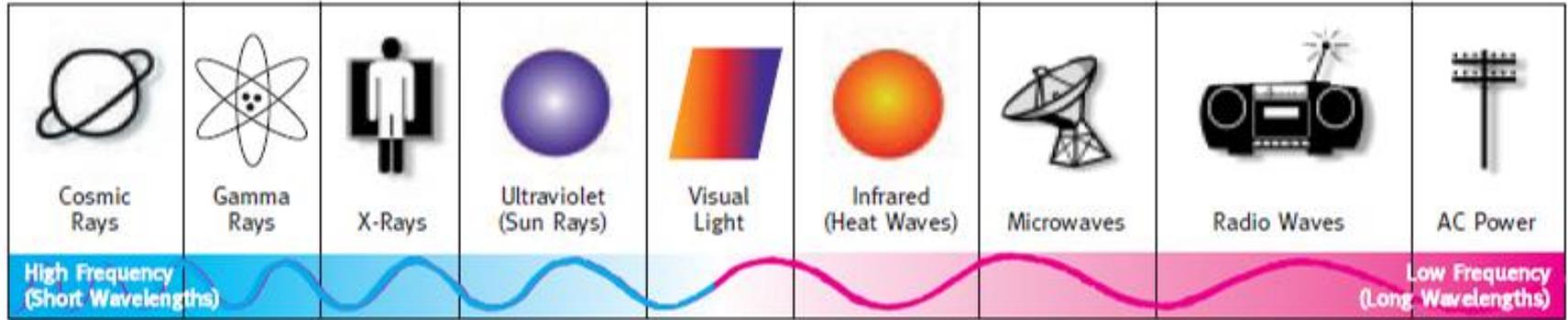
**Control; 1kV/cm-50 pulses; 3kV/cm-50 pulses; 5kV/cm-50 pulses; 8kV/cm-50 pulses**

**Maceration time: 1 hour  
Low temperature**

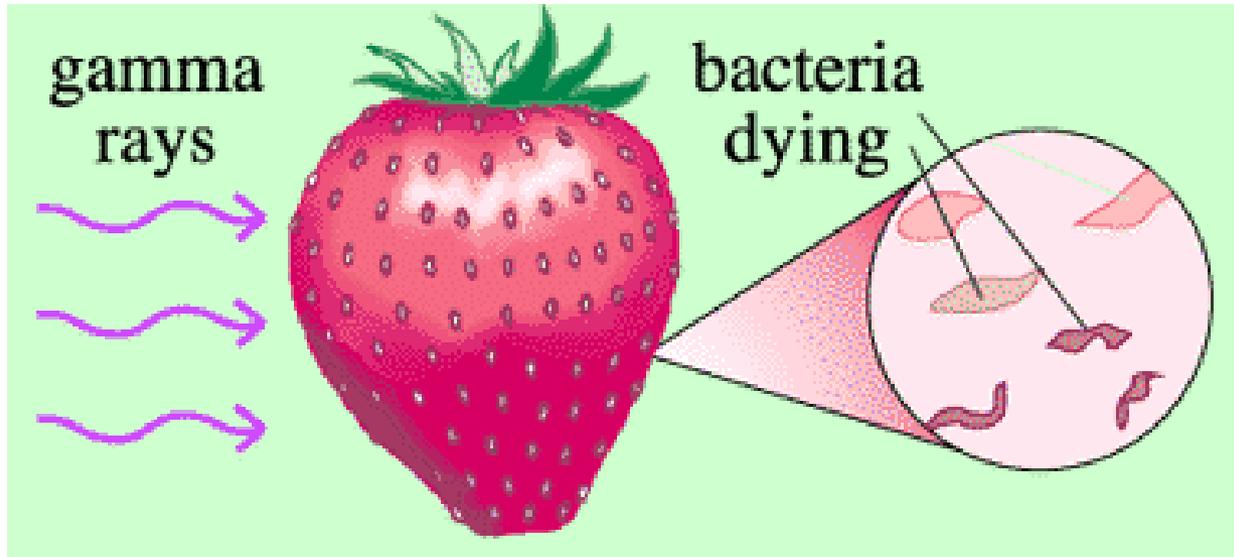
**Emerging technologies to increase extraction**

# Radiaciones ionizantes

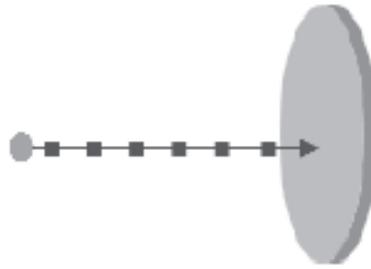
Radiación de alta frecuencia y longitud de onda corta



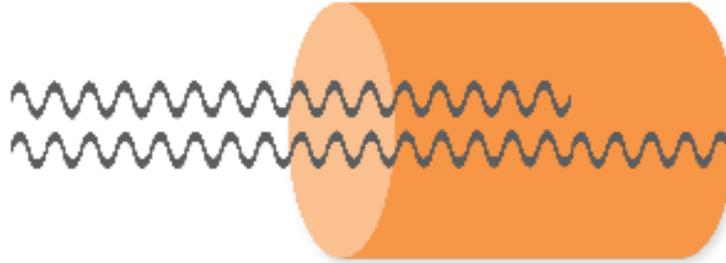
Electromagnetic spectrum



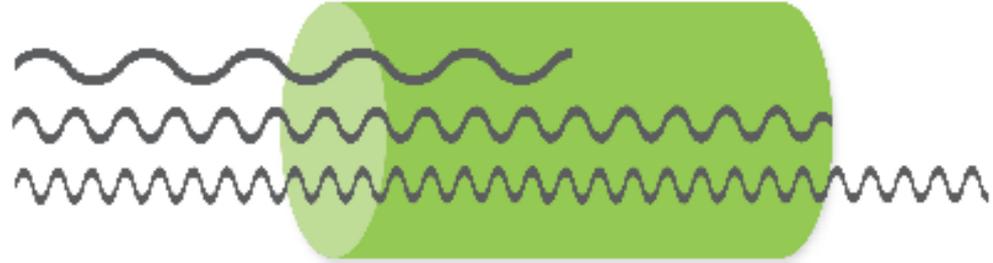
Beta/E-beam ( $\beta$ )



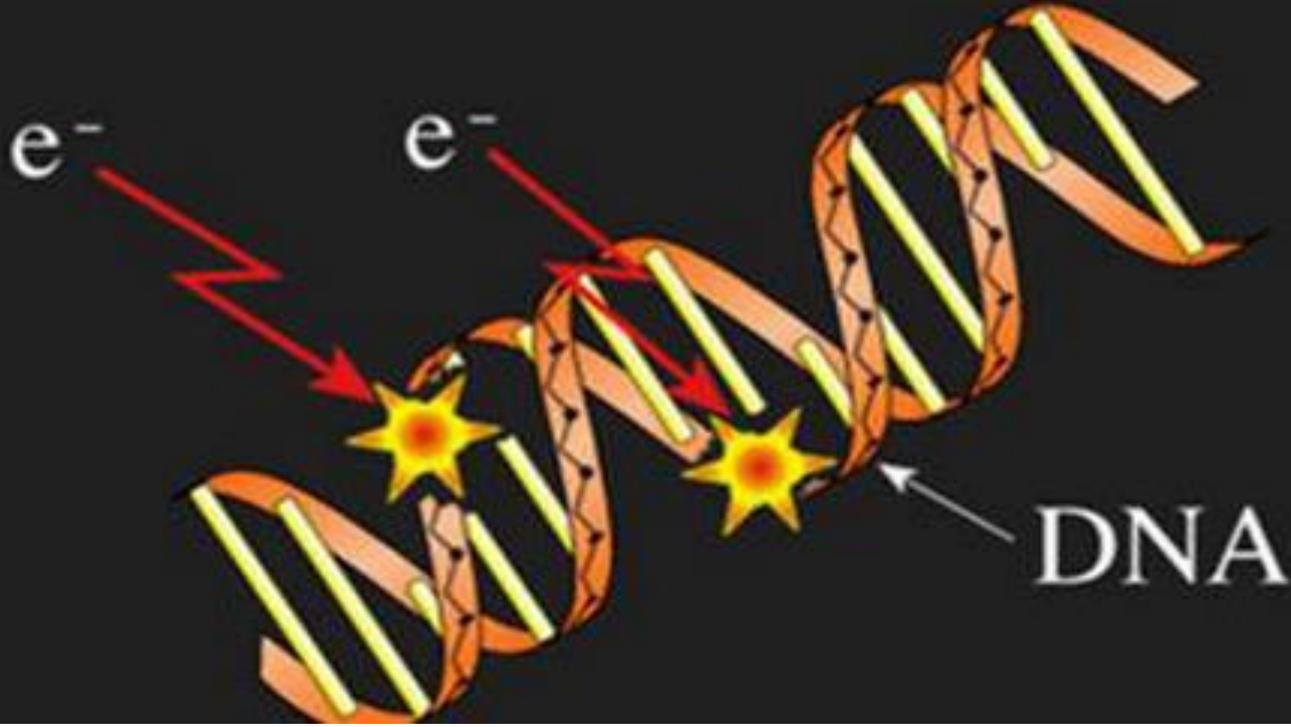
Gamma ( $\gamma$ )

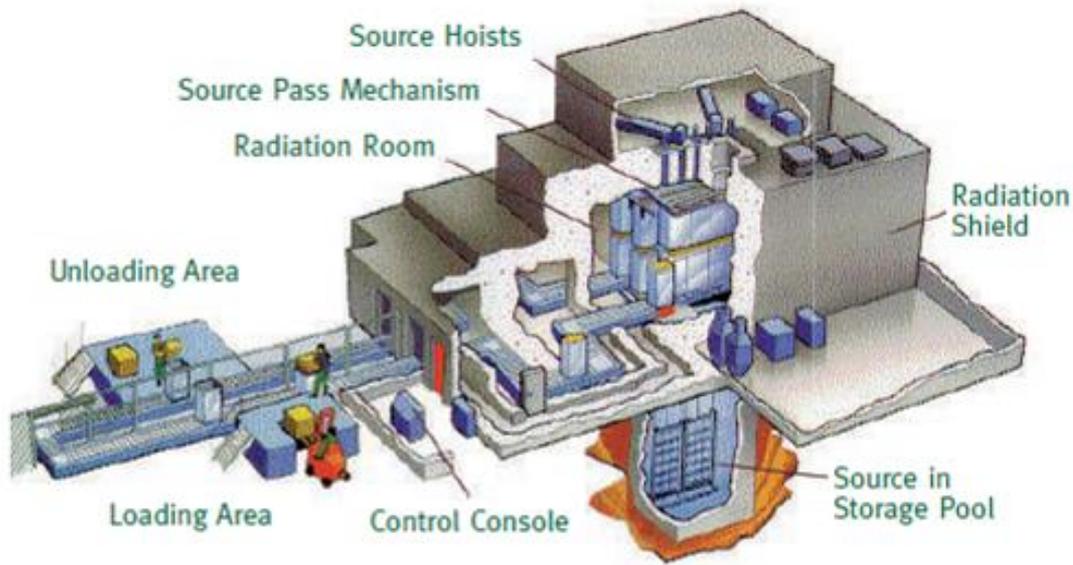


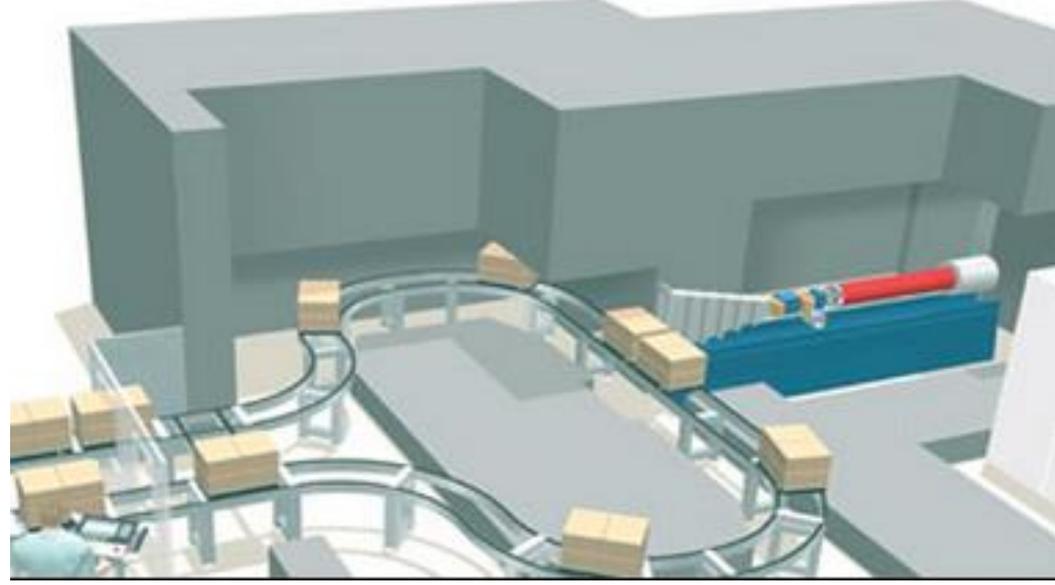
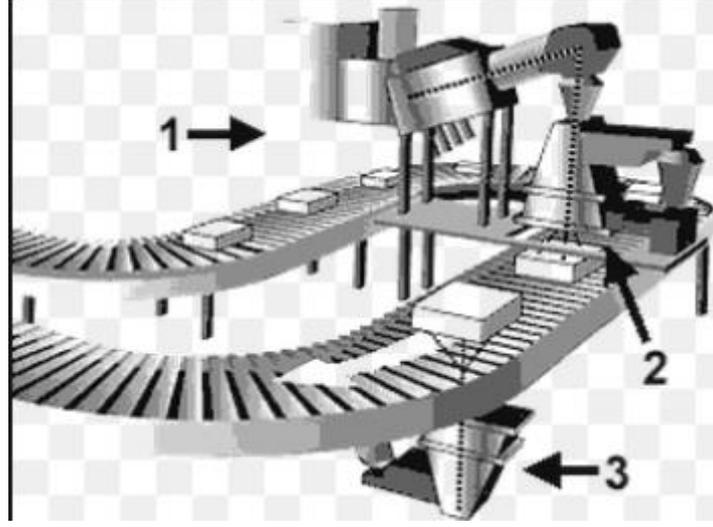
X-ray (X)



# DNA Destruction

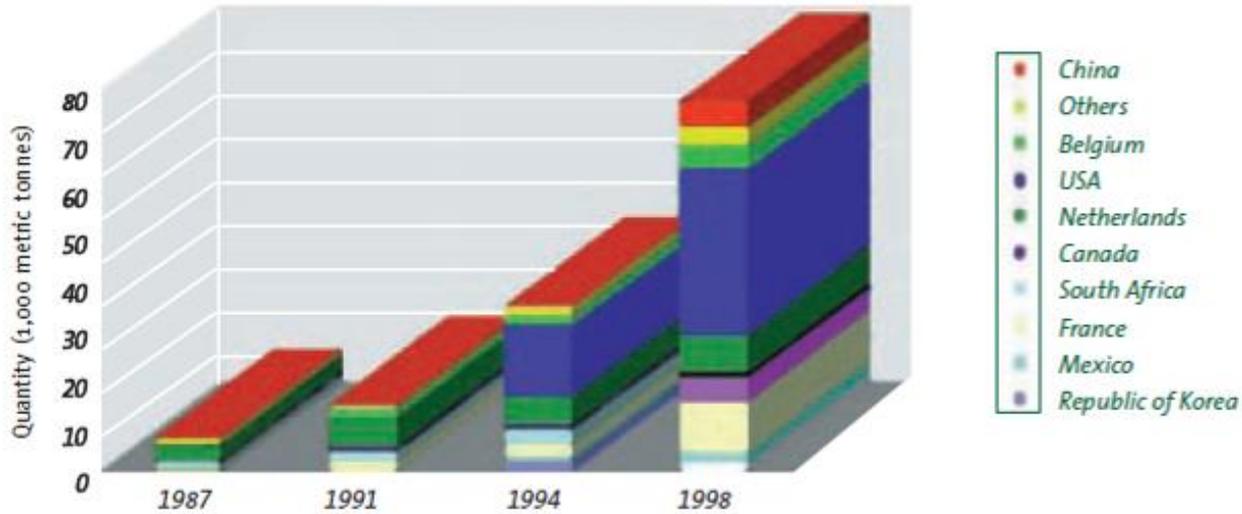








*Estimated quantities of irradiated spices and dried vegetable seasonings*



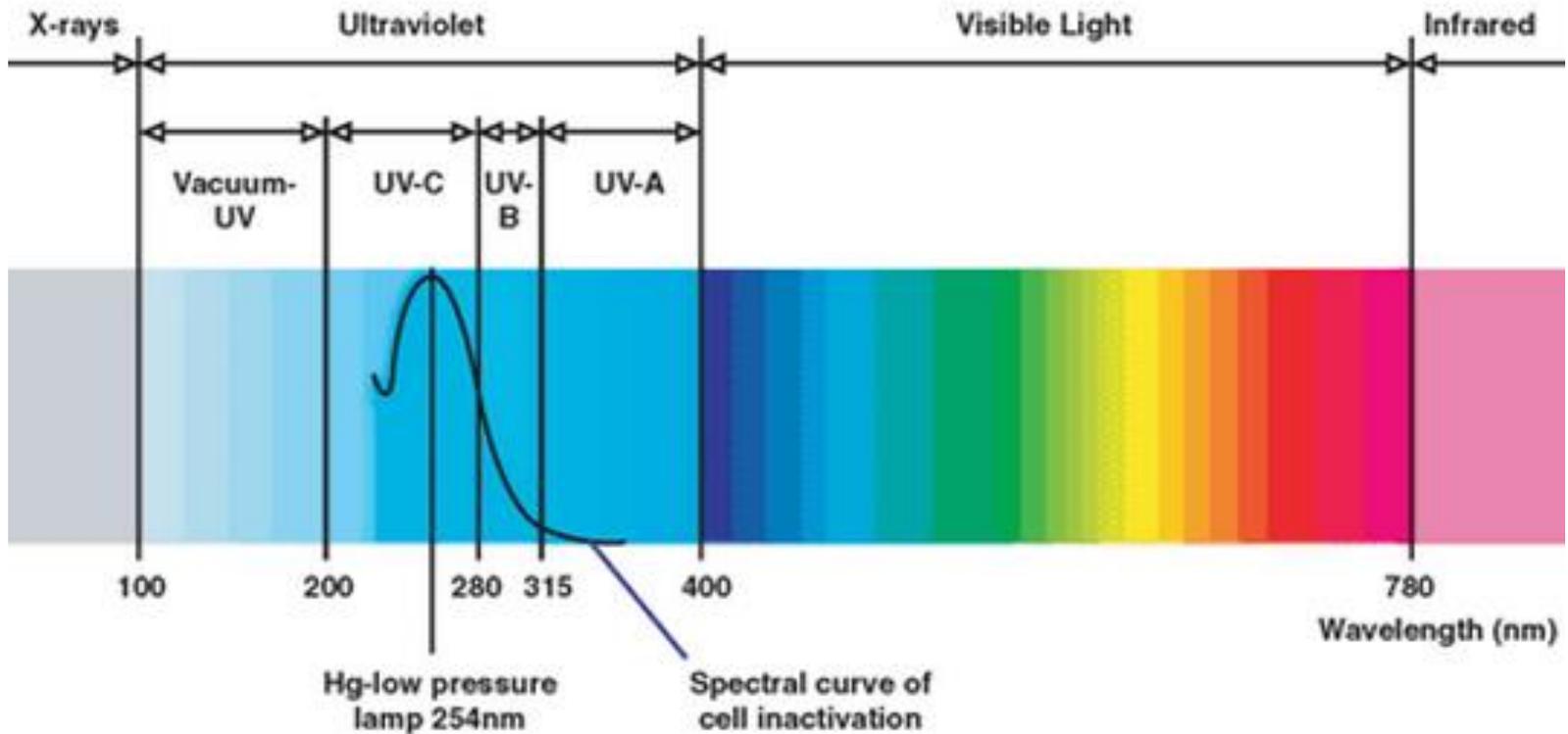
*Facts about food irradiation / 5*

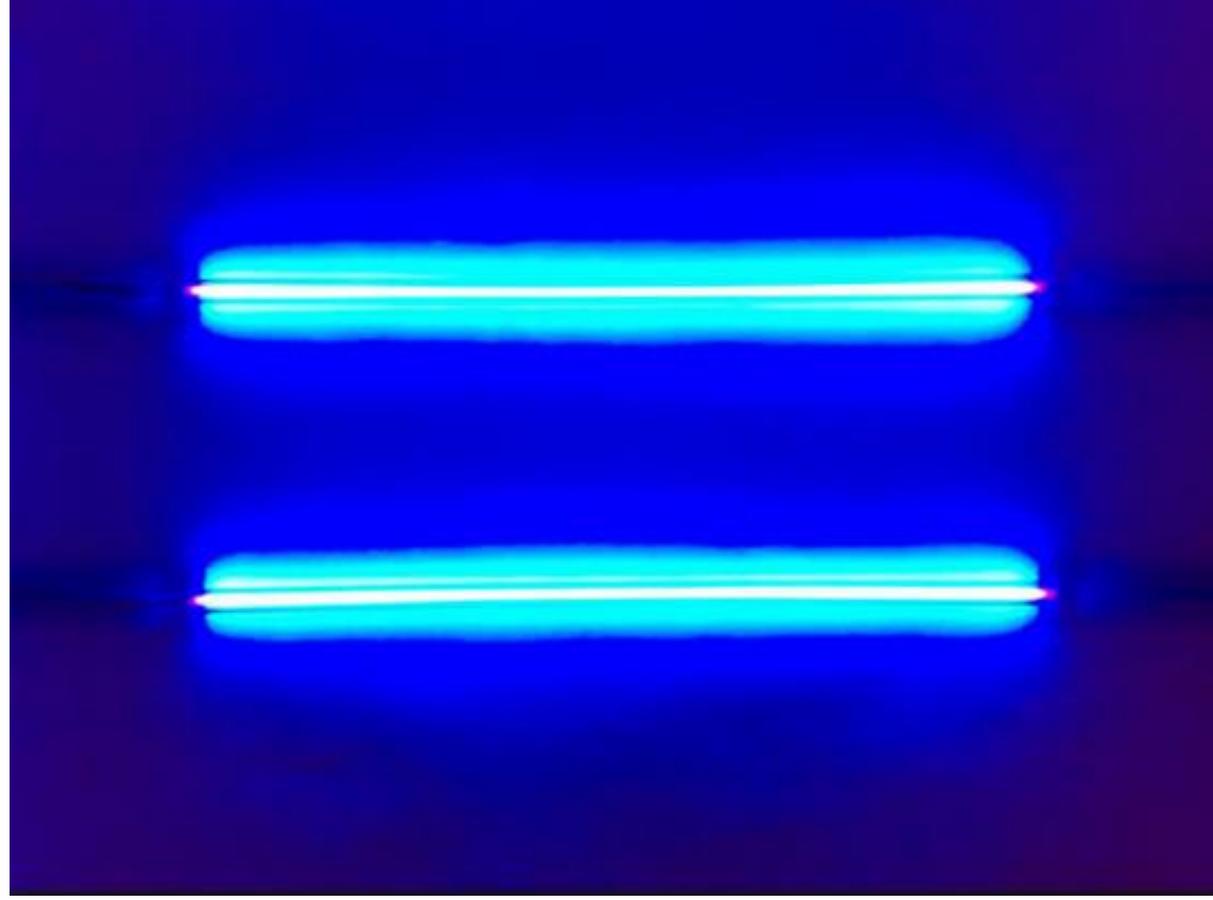
**no térmica: 2-3 °C**  
**Proceso continuo**



# Luz UV. Luz pulsada

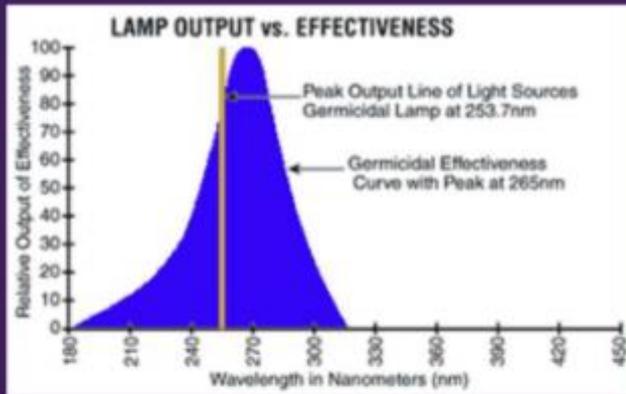
## The Electromagnetic Spectrum





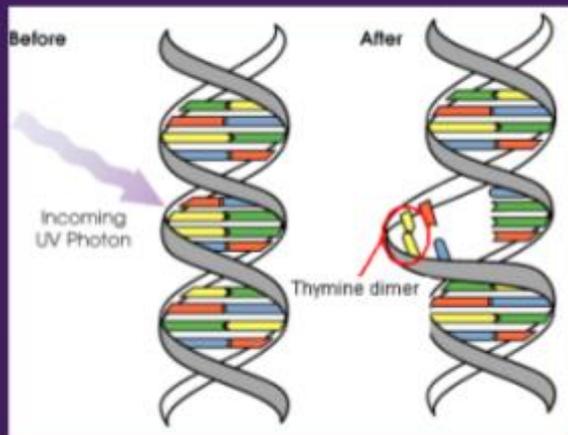
# The UV-C

## ■ Source of UV Light



- Low-Pressure Mercury Lamps and free ozone
- Centered emission at wavelength 253,7 nm
- Destruction of the micro-organisms: Virus, yeasts, Bacteria, Algae, moulds, protozoon
- Maximum germ-destroying effect between 260 - 265 Nm

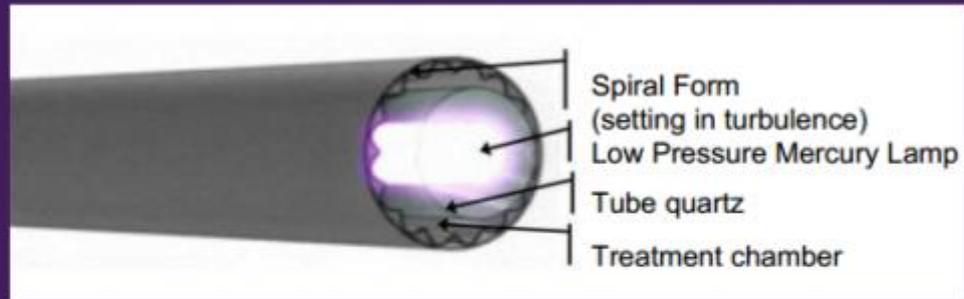
## ■ Damage on the basis pyrimidic of nucleic acid (DNA, ARN)



- Dimer formation especially when 2 molecules of thymine or cytosine are close on the same bit to DNA
- For the other bases of DNA, the effect is less
- Hydration of the pyrimidic bases: deterioration of the genetic code
- Denaturation of the DNA: consequence of the formation of dimers and hydrates

# Description of the “sterilizer” with UV-C

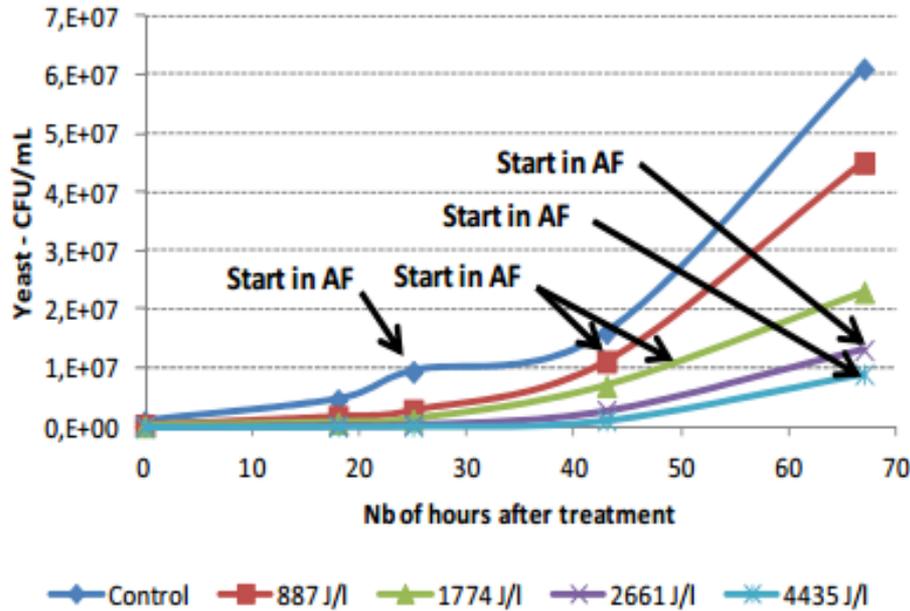
- The « Turbulator »



- Unit of sterilization SP40

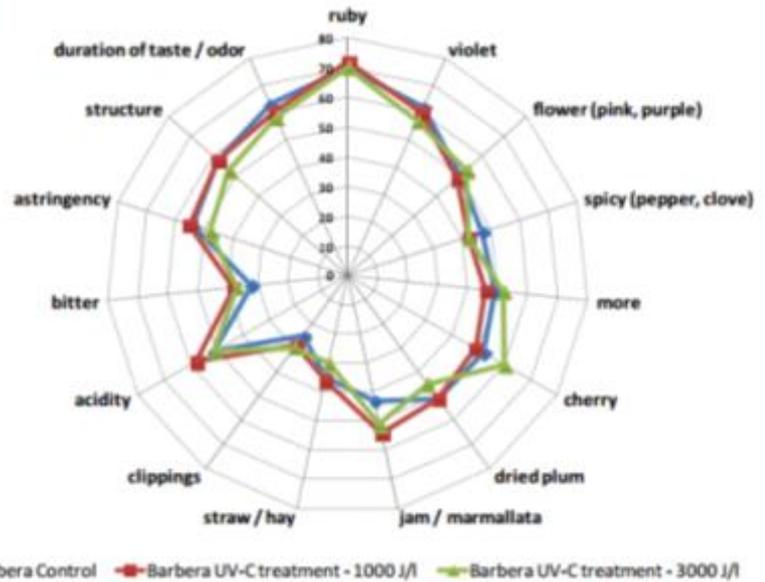


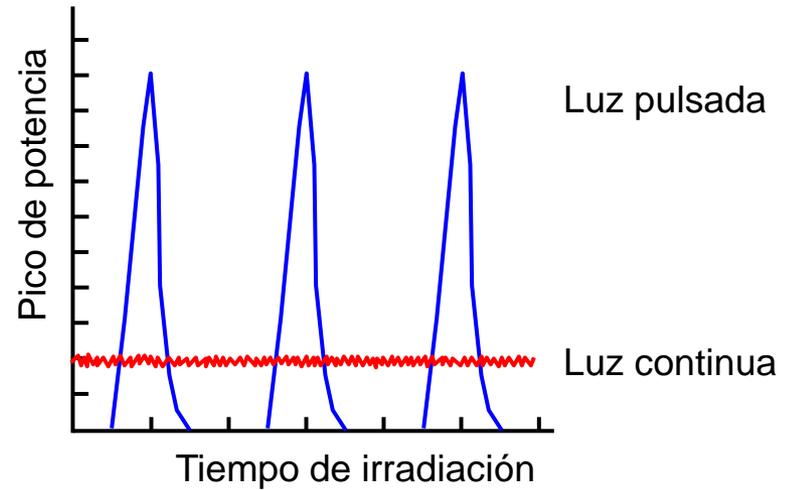
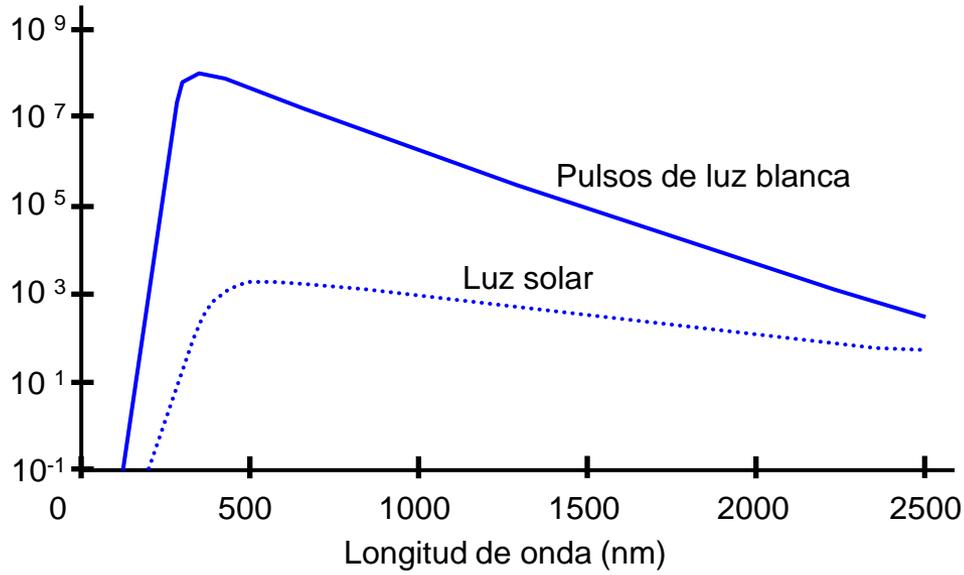
# Sauvignon 2010



no térmica  
Proceso continuo

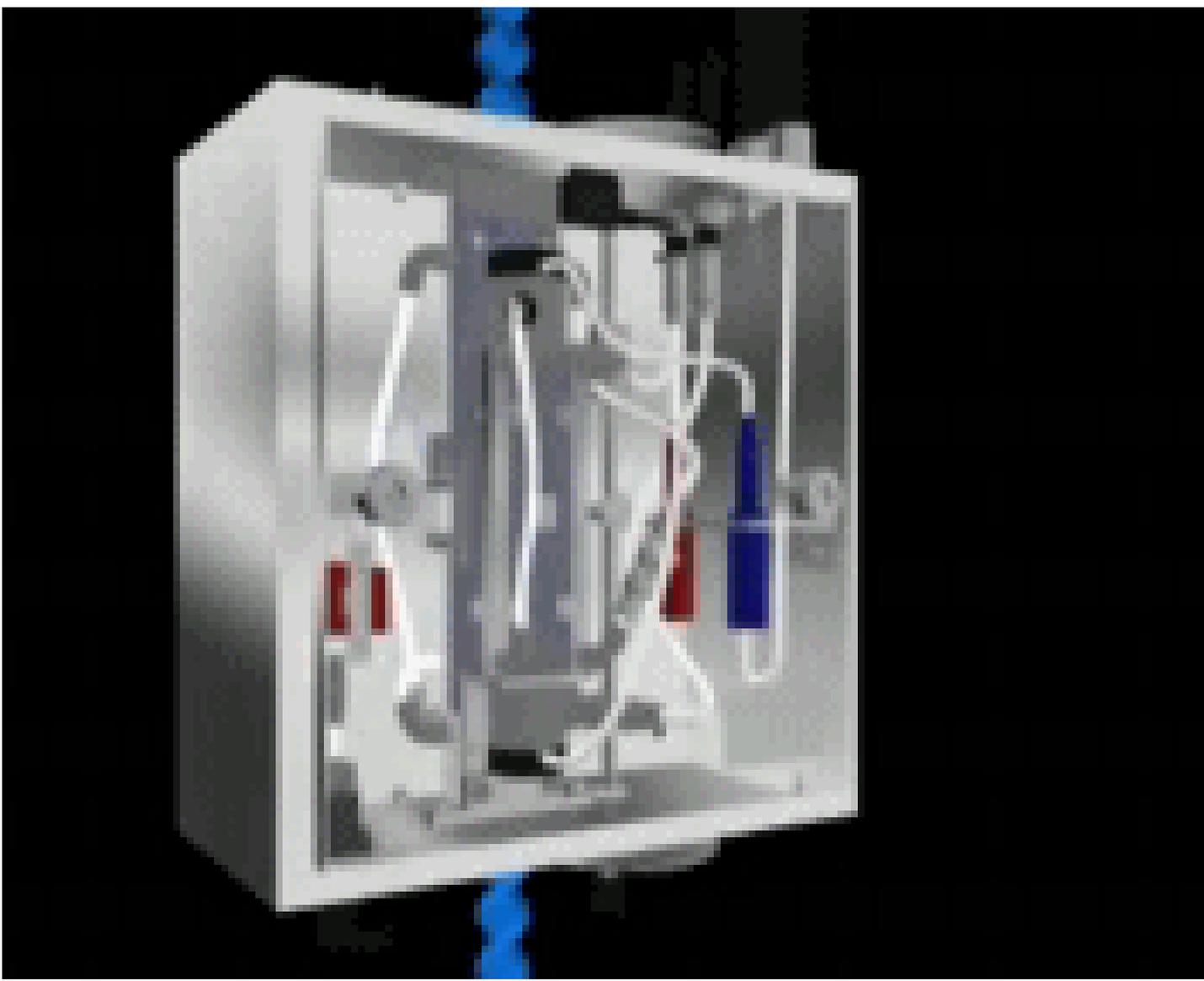
2011



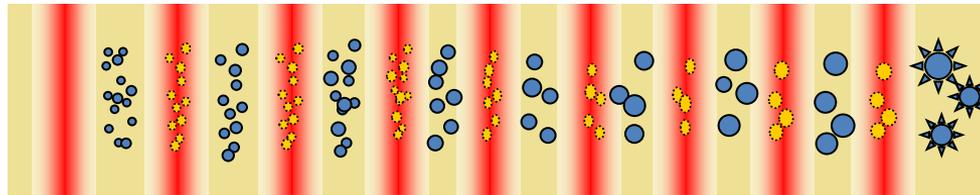
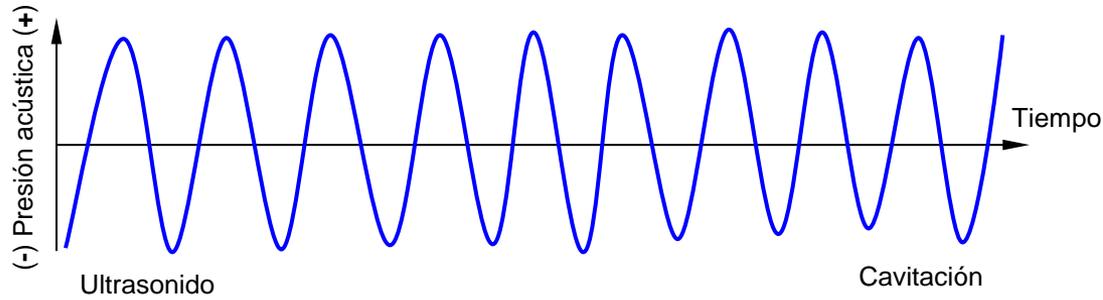


$$300 \text{ J} / 0,3 \text{ ms} = 1 \text{ MW}$$

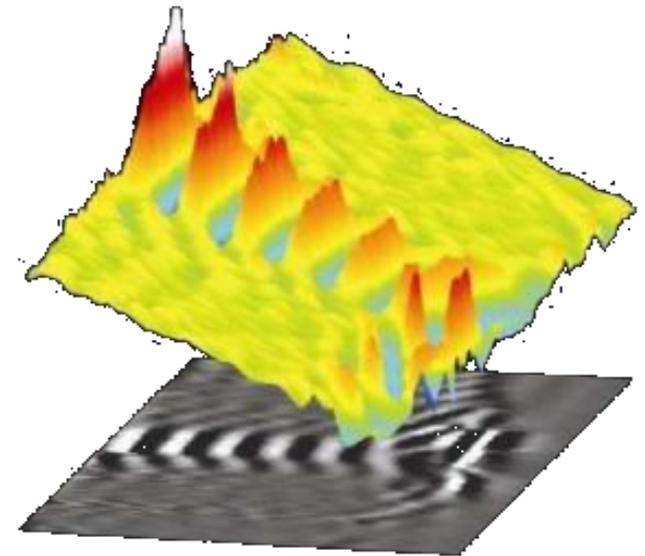




# Ultrasonidos UV.



Zonas de compresión y expansión al aplicar ultrasonidos a un alimento



# Ultrasonidos UV.



produce calentamiento  
Proceso continuo  
Menor efectividad antimicrobiana

# Técnicas emergentes para el control de microorganismos

## Conclusiones

Nuevas alternativas de sanitización no térmica de uvas y vinos

Mejora de la implantación de starters

Buena calidad organoléptica

Reducción de los niveles de SO<sub>2</sub>

Minimizar la aparición de moléculas conflictivas relacionadas con el metabolismo microbiano

-EPs

-Toxinas (OTA, EC, Hist)





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**Muchas gracias!**

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