

#OLIVAR2017

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JUEVES  
27 DE ABRIL DE 2017

# El cultivo incombustible

# EL OLIVAR



●●● PATROCINADORES:



●●● COLABORADORES:



●●● PROMOTOR:



●●● ORGANIZADOR:



## BLOQUE I MECANIZACIÓN Y REDUCCIÓN DE COSTES

# Índices de monitorización de la maduración de la aceituna



Ctra. Villafranco - Balboa Km. 1,2  
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**Alfonso Montaña**  
**Oleólogo de CTAEX**

27 de abril 2017





# Cuando recolectar el fruto





🌿 El **Índice de Madurez** de Uceda y Frías (1975) el más aceptado

🌿 Pero cada variedad posee diferentes ritmos de maduración y singulares pigmentaciones en su epicarpo

IM=0,0



IM=1,0



IM=2,0



IM=3,0



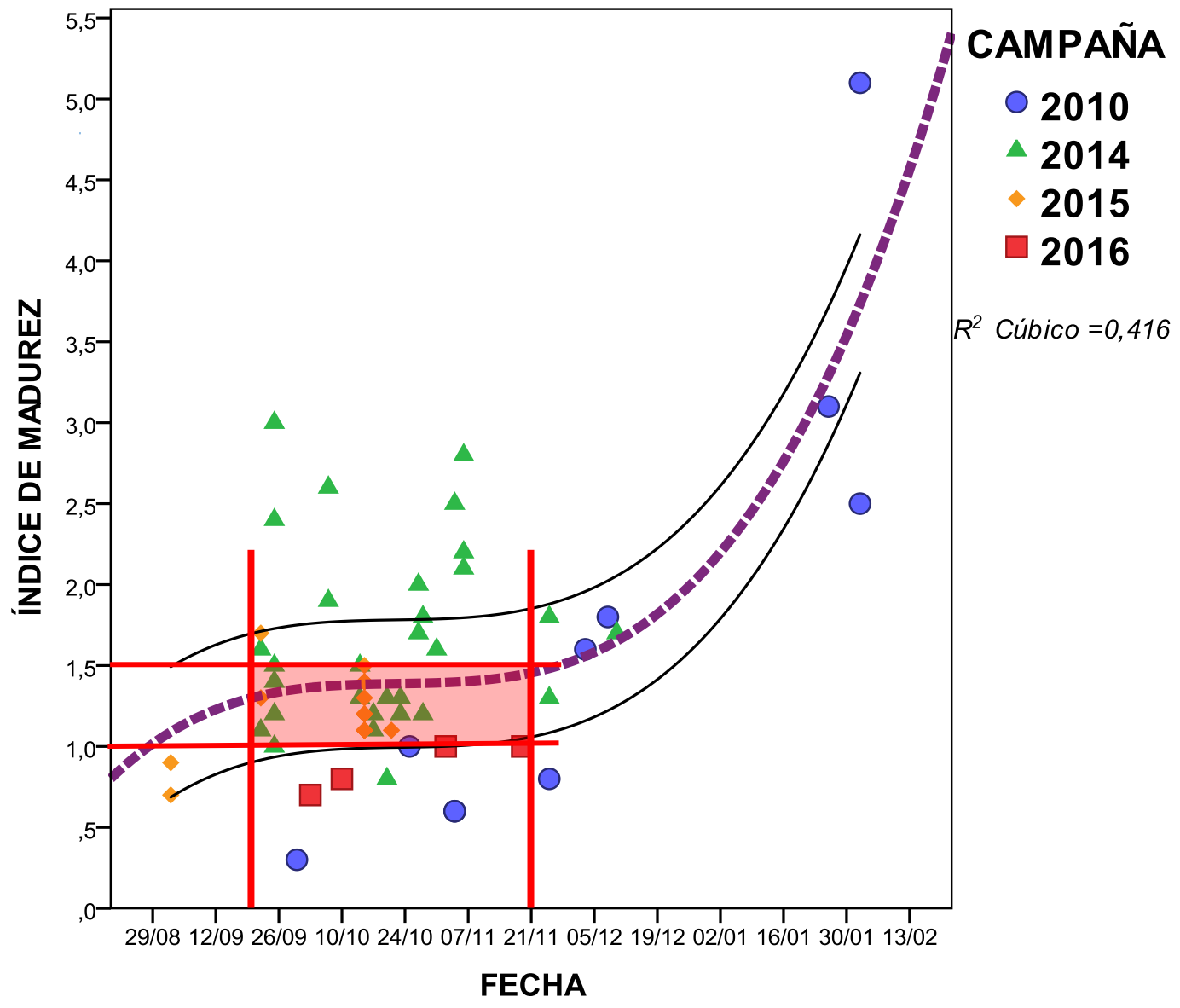




## Arbequina *(datos Montaña, 2016),*

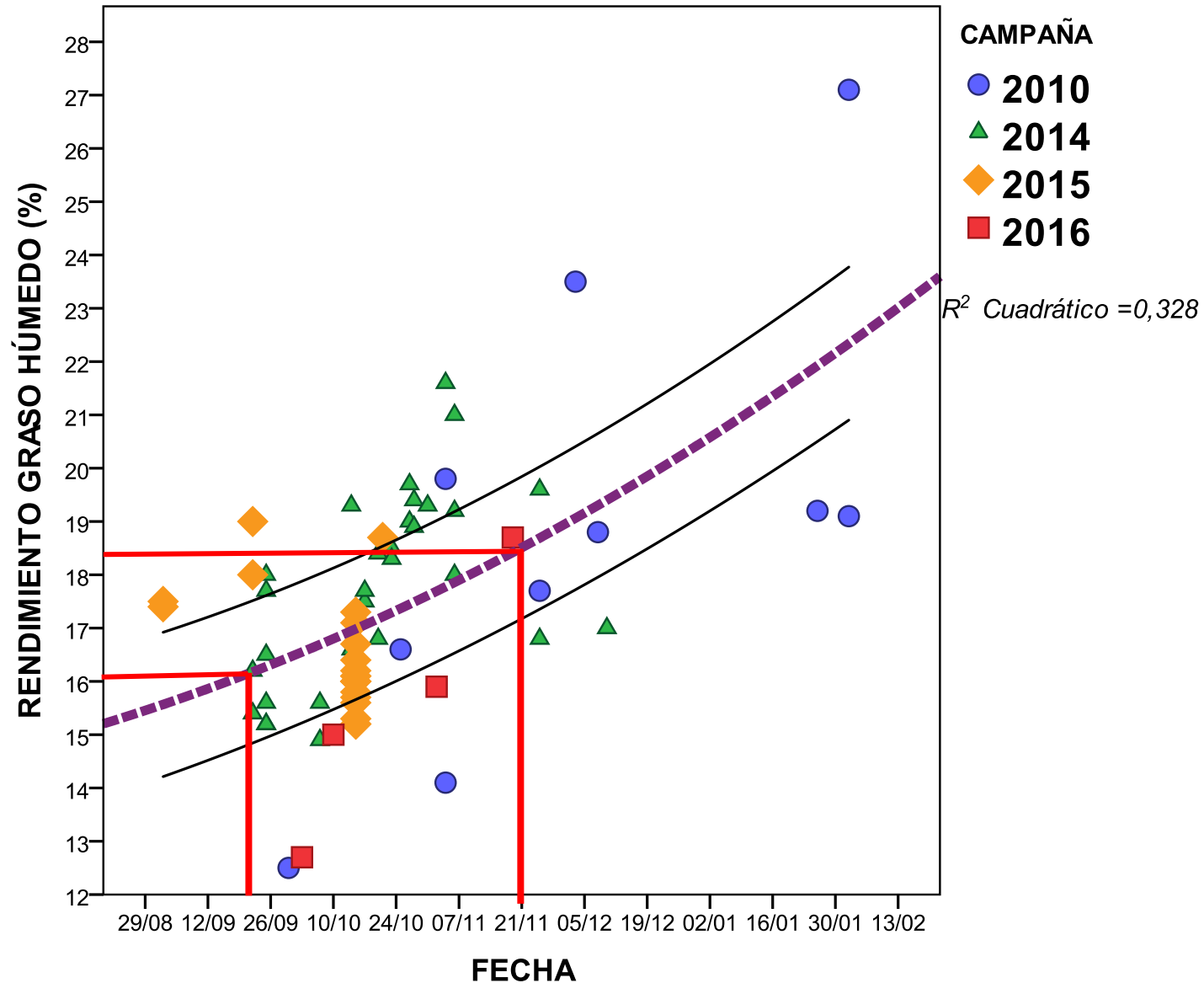
- 🕒 Variedad Tardía,
- 🕒 de maduración muy lenta,
- 🕒 Inicio de la maduración (IM=2) el 09/dic (+39 con respecto a MC),
- 🕒 De IM=2 a IM=4 en 69 días,

# Maduración de Arbequina



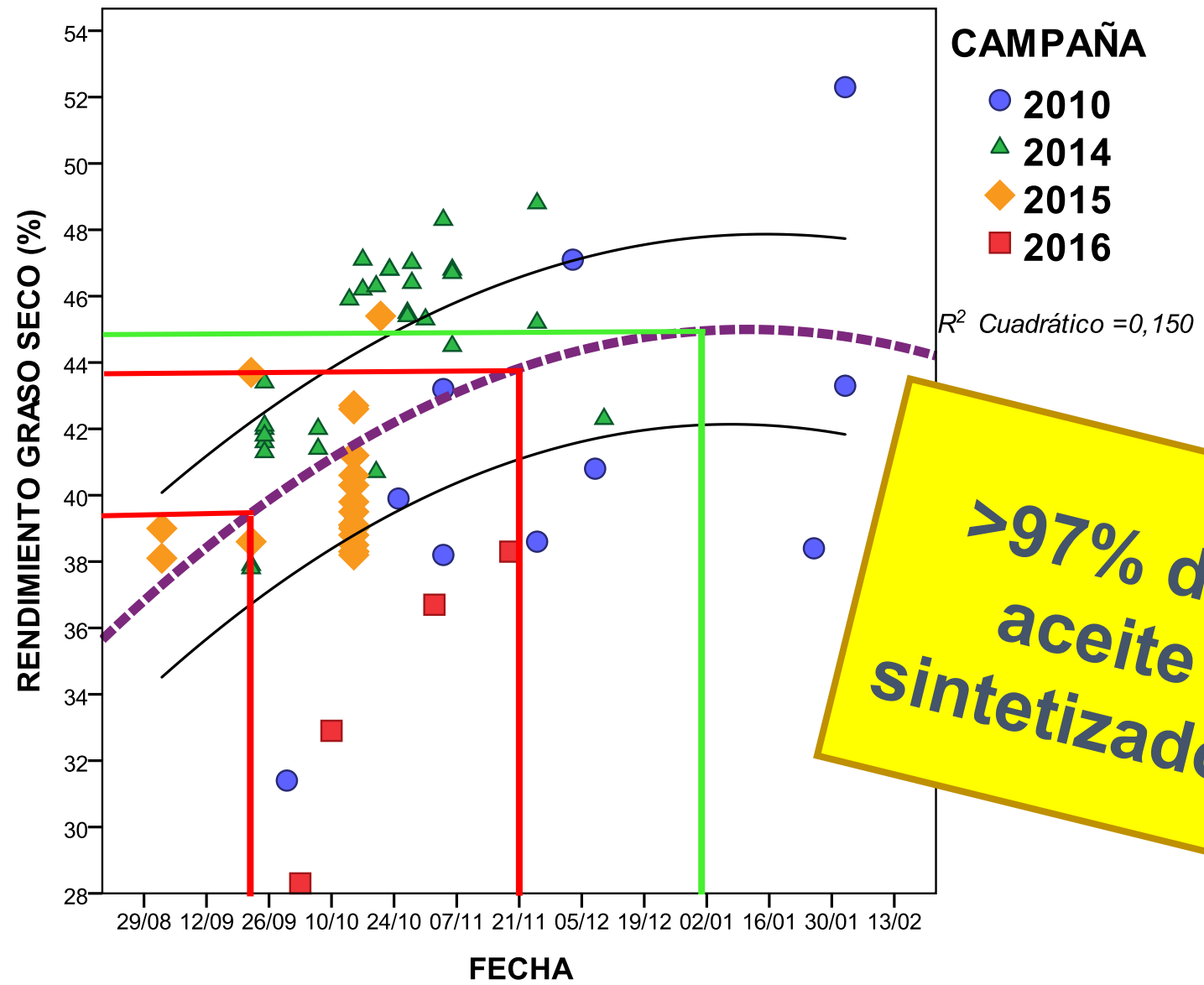


El contenido graso es otra fuente de información de cuando iniciar la recolección del fruto, por su gran importancia económica.





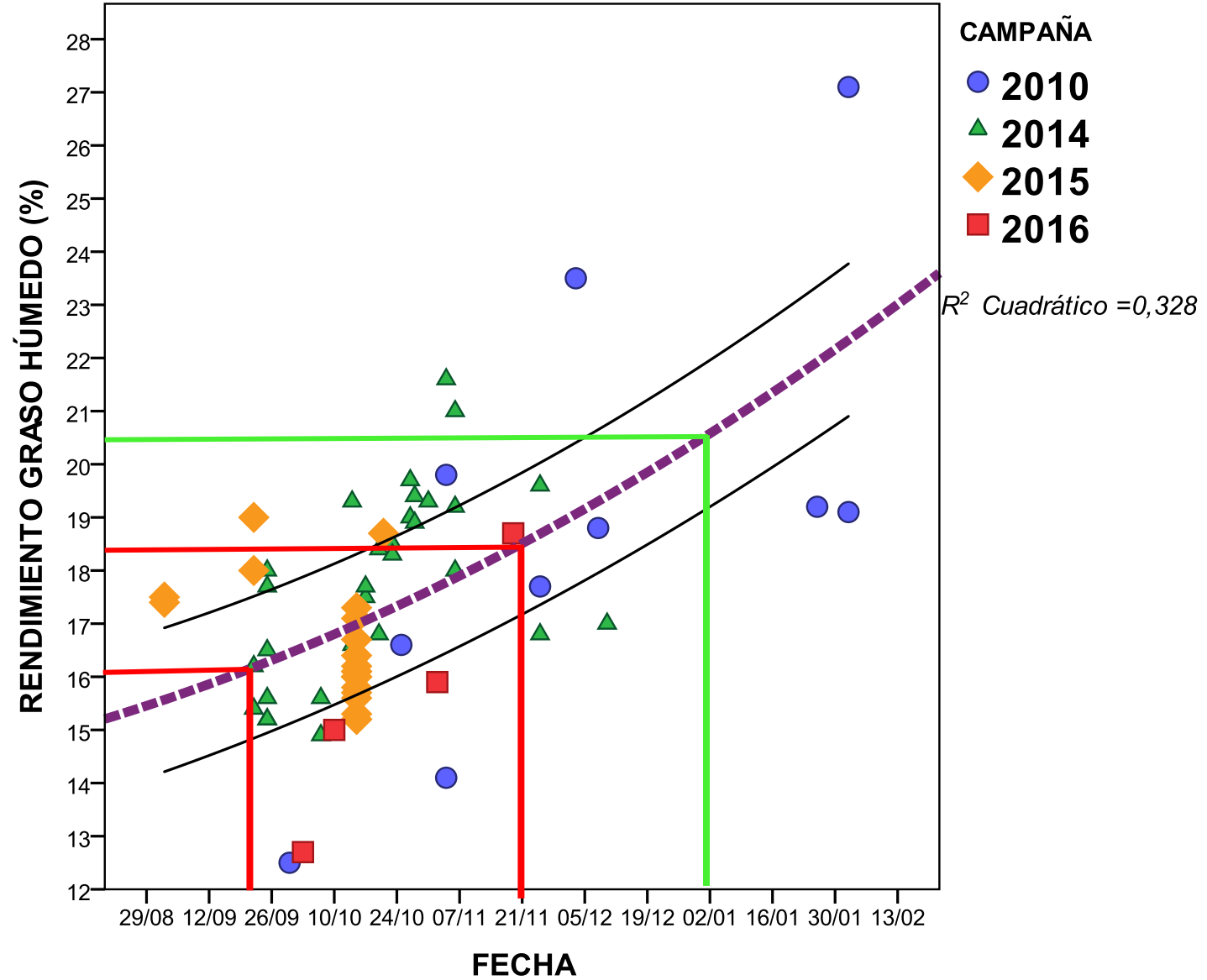
La forma correcta más adecuada es construir una gráfica con el contenido graso pero expresado en seco.



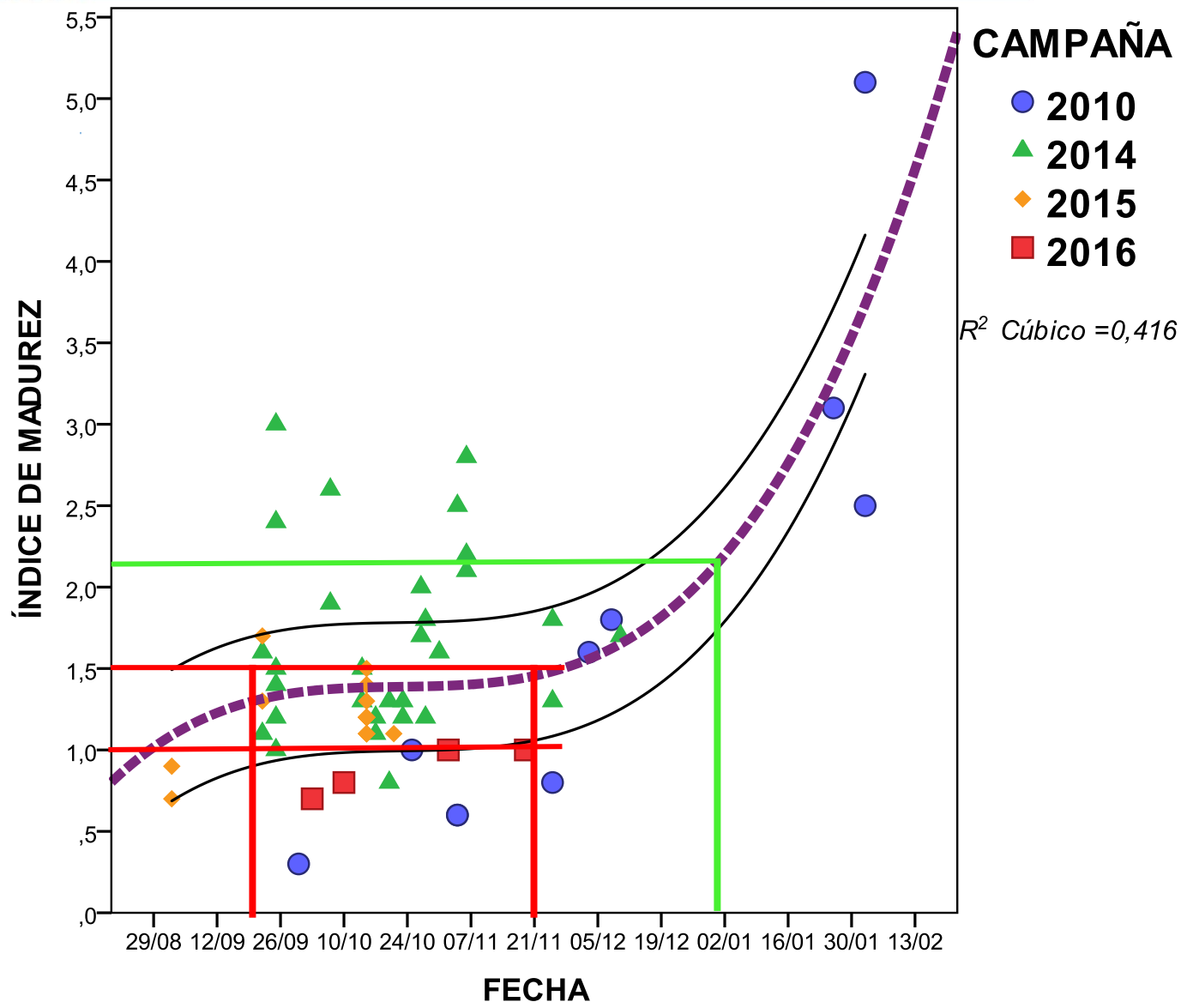
>97% del aceite sintetizado!!



# Contenido Graso de la aceituna



# Contenido Graso de la aceituna





# ¿qué opciones se pueden disponer para obtener más información?

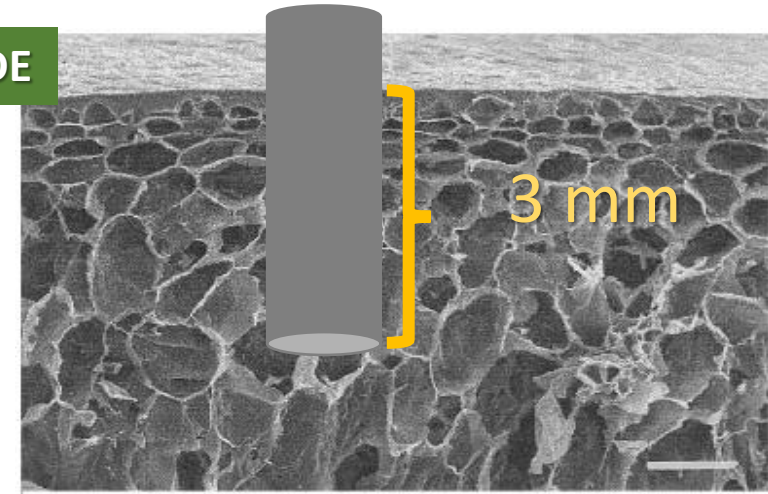
No estamos hablando de alternativas, sino como incrementar los indicadores que nos ayuden a una mejor monitorización de la maduración.

*Más información, menos errores en la toma de decisiones*

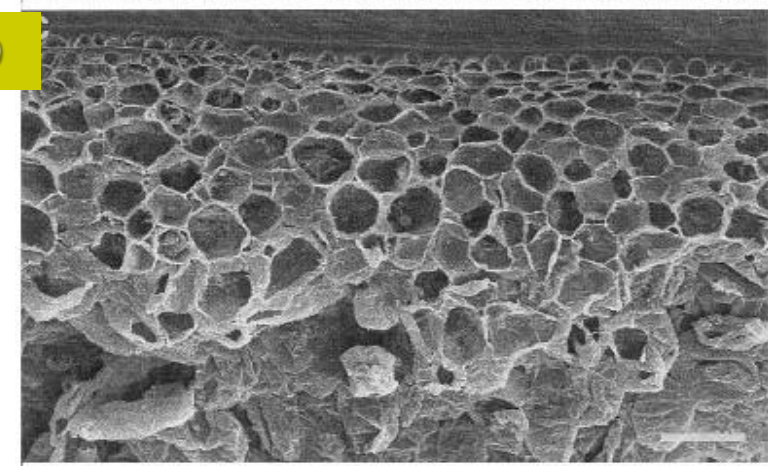


# Resistencia a la Penetración

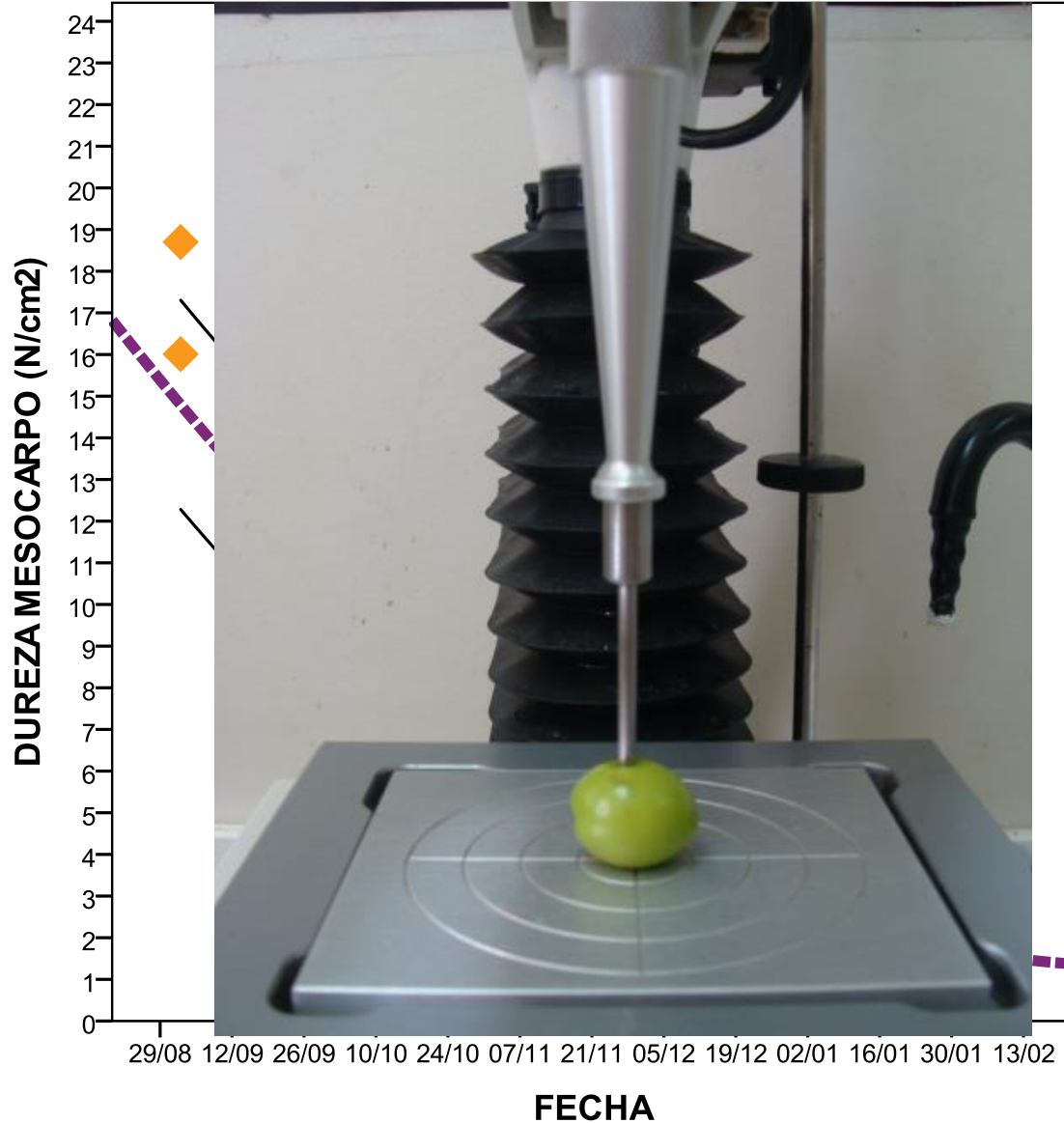
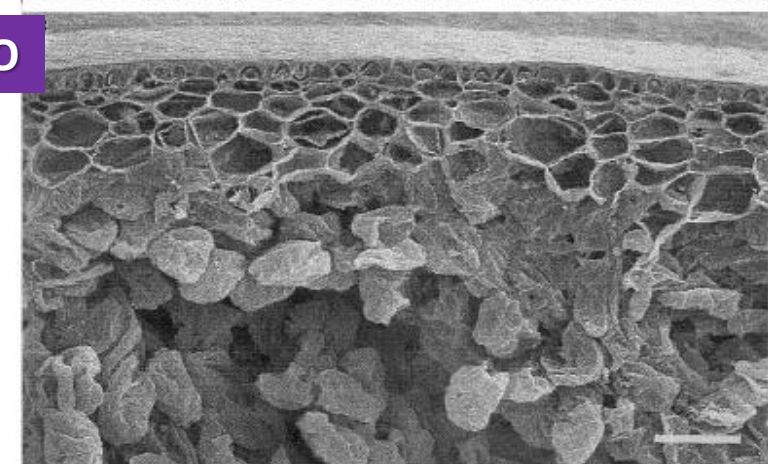
VERDE



ENVERO



MADURO



## CAMPAÑA

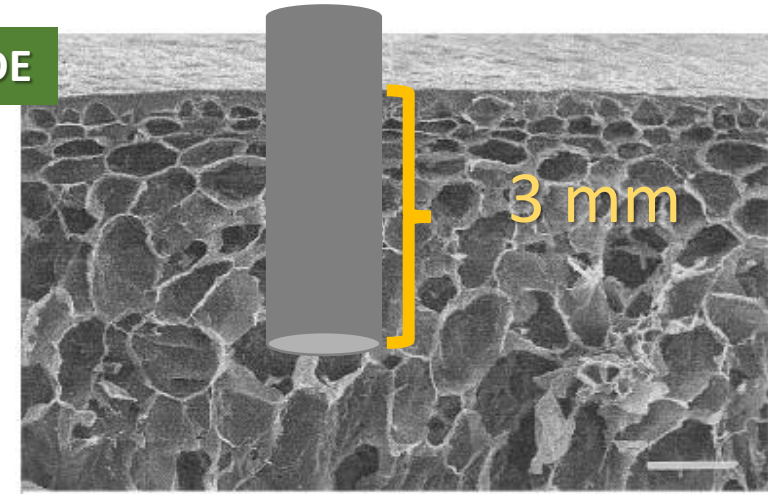
- 2010
- ▲ 2014
- ◆ 2015
- 2016

$R^2$  Cuadrático = 0,363

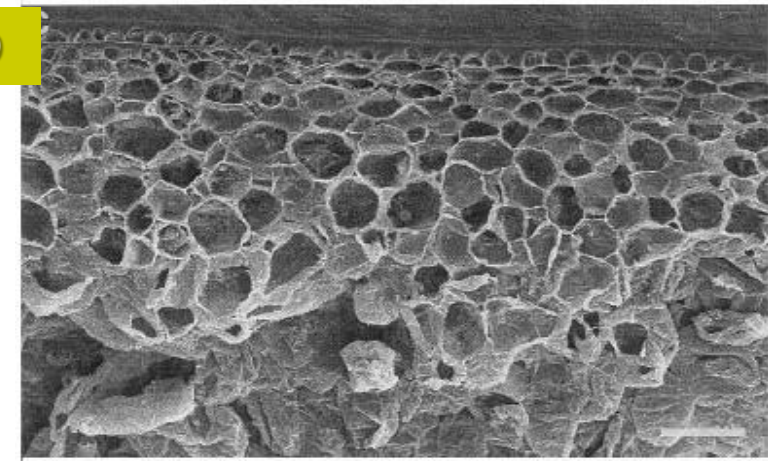




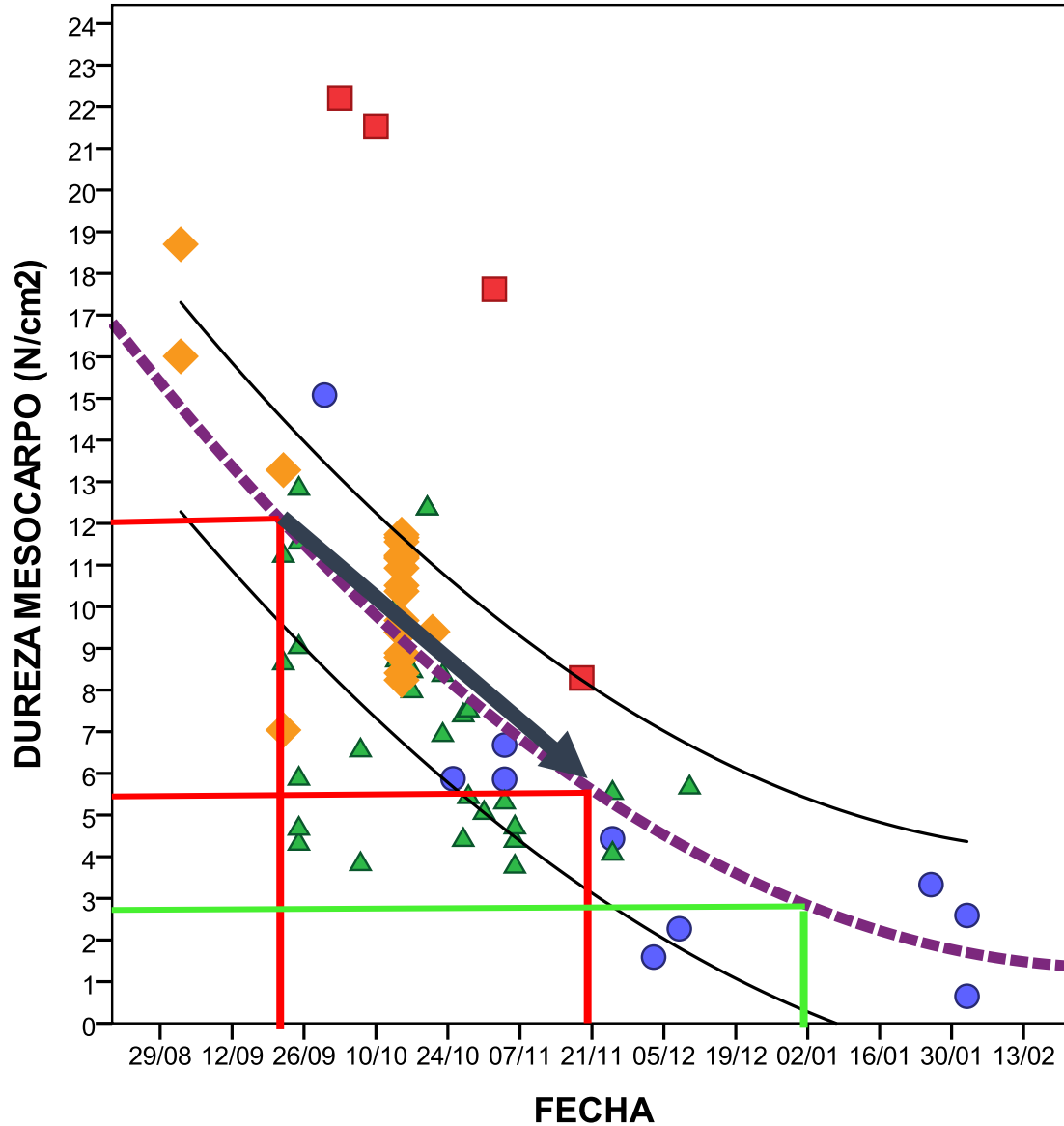
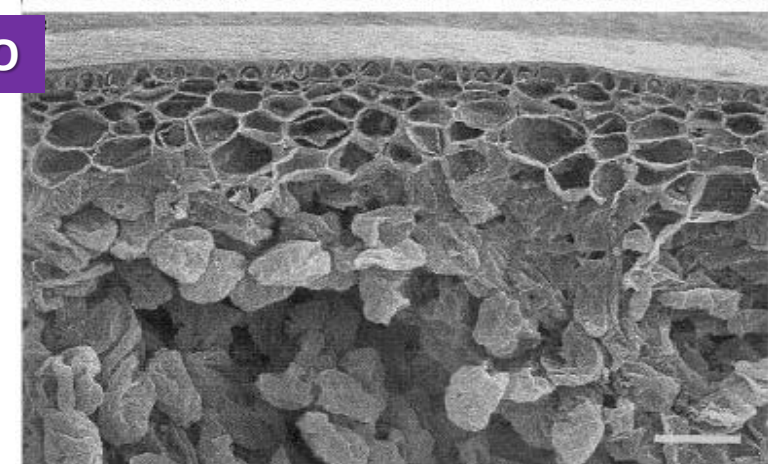
VERDE



ENVERO



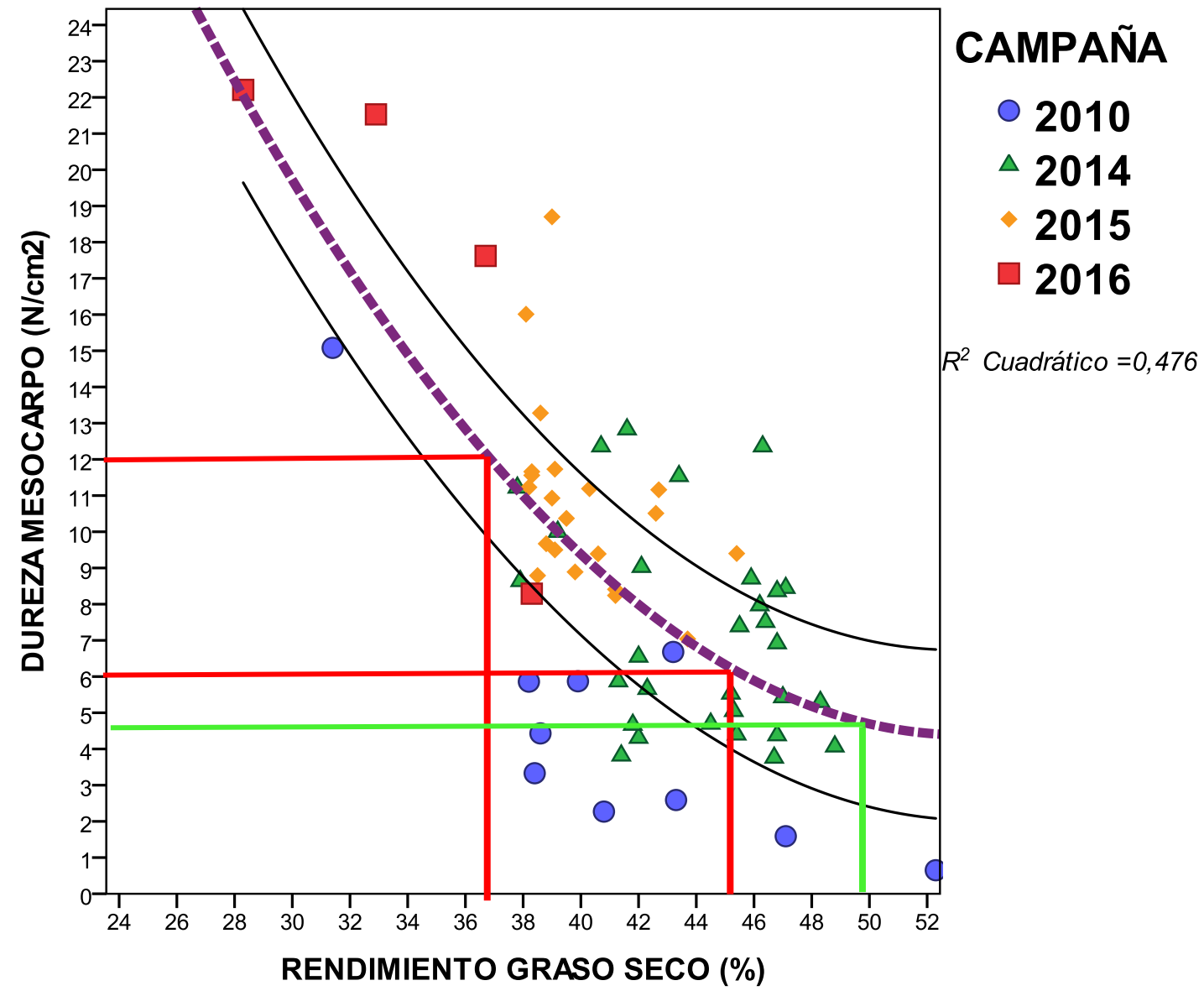
MADURO



$R^2$  Cuadrático = 0,363



# Resistencia a la Penetración





- 🌳 La monitorización de las aceitunas es crucial para obtener AOVE de calidad,
- 🌳 Bajo determinadas condiciones los frutos no cambian de pigmentación pero ello no implica que otros procesos fisiológicos no prosigan acorde a la maduración,
- 🌳 Junto al RGS la cuantificación de la dureza de los frutos nos aportará información muy útil para decidir el momento óptimo de recolección,



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# Gracias por su atención

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# “Hacia la recolección integral del olivar tradicional”

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UNIVERSIDAD DE CÓRDOBA

**Rafael R. Sola-Guirado**

*Dr. Ingeniero Industrial*

**AGR<sub>126</sub>. MECANIZACIÓN Y TECNOLOGÍA RURAL**

## INTRODUCTION

*There is a problem with traditional olive orchards*

*What we can do?*

To introduce improvements by mechanization

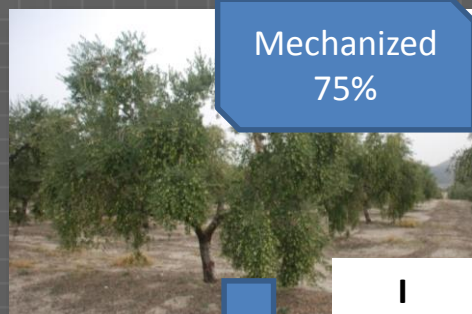
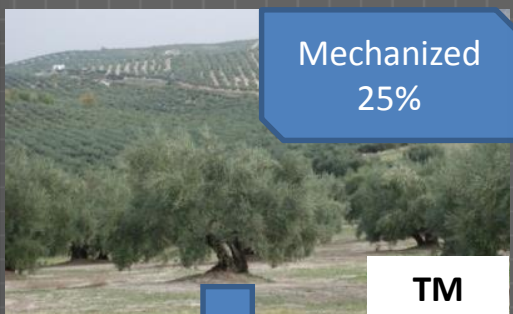
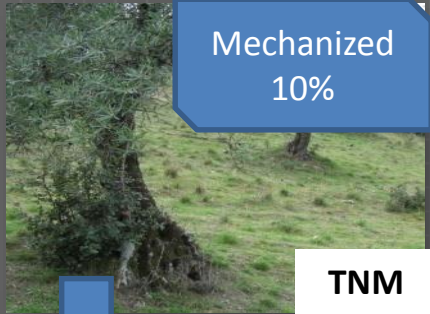
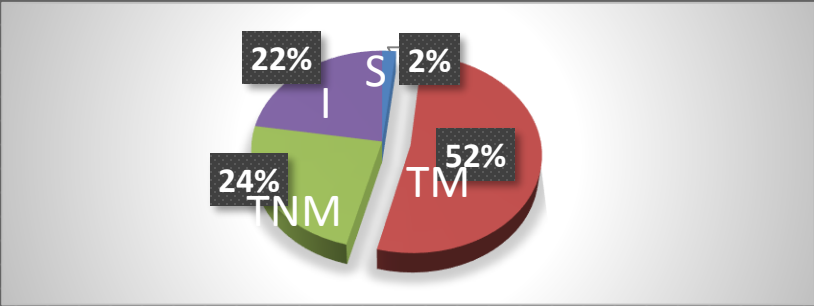
¿Harvester?





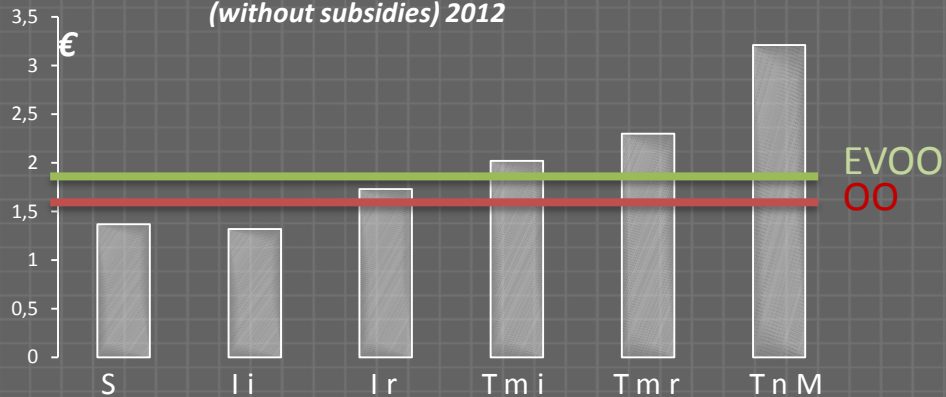
How is the situation of the olive sector?

# OLIVE SECTOR

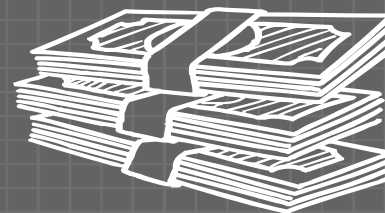


## Profitability

*Olive growing cost by orchard  
(without subsidies) 2012*



	Cost percentage (%)	
	TM rainfed	TM irrigated
Pest	11,9	7,9
Pruning	17,0	11,4
Fertilization	5,1	3,4
Soil	26,7	17,8
Irrigation	0,0	19,2
Harvesting	39,3	40,2



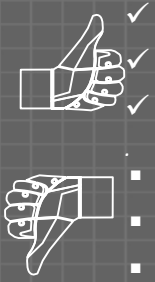
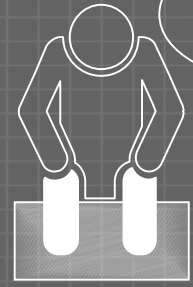


What about harvesting?

Any solution?



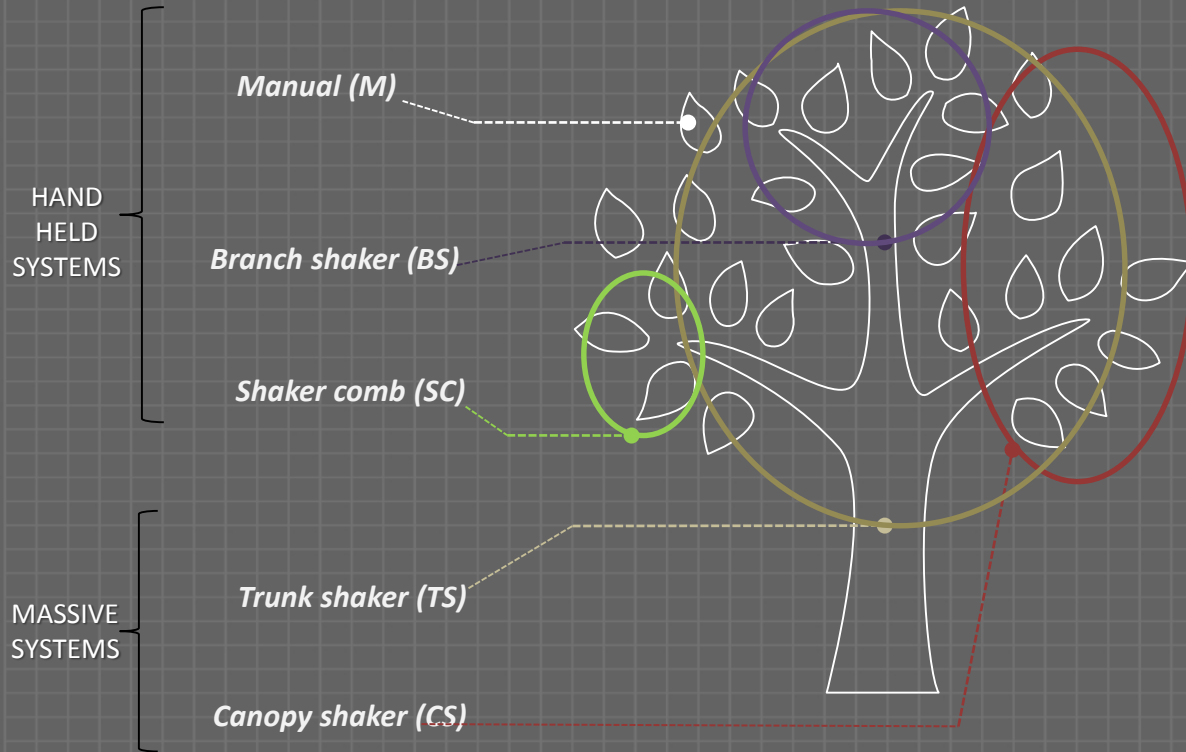
IS IT POSSIBLE THE INTEGRAL HARVESTING OF TRADITIONAL OLIVE ORCHARDS??.



- ✓ *Vibration on bearing branches*
- ✓ *Continuos harvesting*
- ✓ *Detach and catch fruit*
- *Tree training*
- *Large spacing between trees*
- *Canopy contact*

**TARGET**  
Develop a  
continuous harvester for  
traditional olive orchard  
based on canopy shaking

# 1. AVAILABLE HARVESTING METHODS



## 2. CANOPY SHAKING BACKGROUND

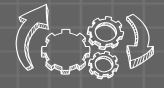
*CS in other crops*



*CS in olive trees?*



*Harvest efficiency?*



*Harvester?*



DRUM

APPROACH SYSTEM

AMPLITUDE AND FREQUENCY

SHAKER HEAD



## 2. CANOPY SHAKING BACKGROUND

CS in other crops



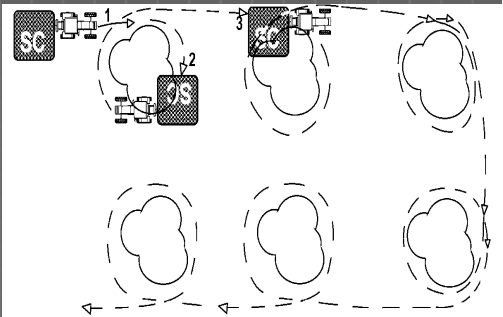
CS in olive trees?



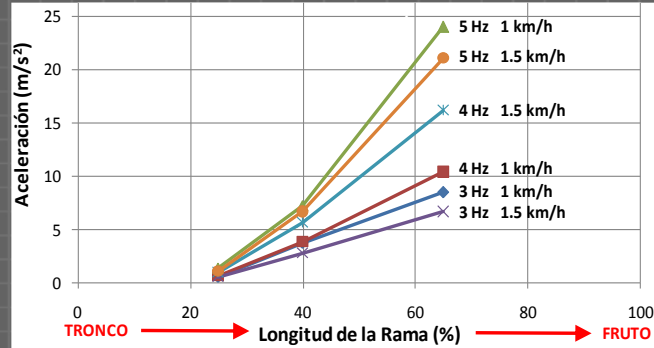
Harvest efficiency?



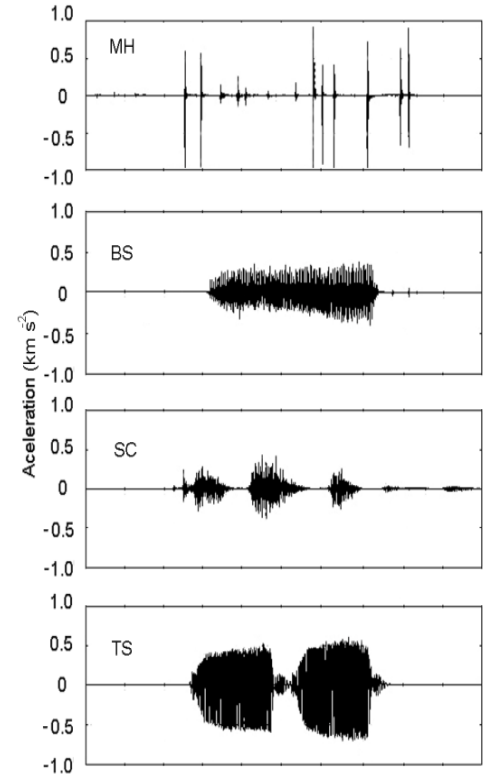
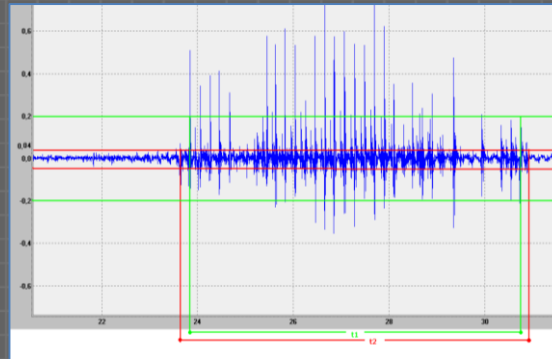
Harvester?



Field capacity: 0,2 -0,4 ha/h



- ✓ *Vibration pattern with shots of high amplitude and short duration*
- ✓ *Frequency (4-5 Hz) and ground speed (1 km/h)*
- ✓ *Low vibration transmission*
- ✓ *It is possible harvest around trees*
- ✓ *Tree training for irregular canopies*





## 2. CANOPY SHAKING BACKGROUND

CS in other crops



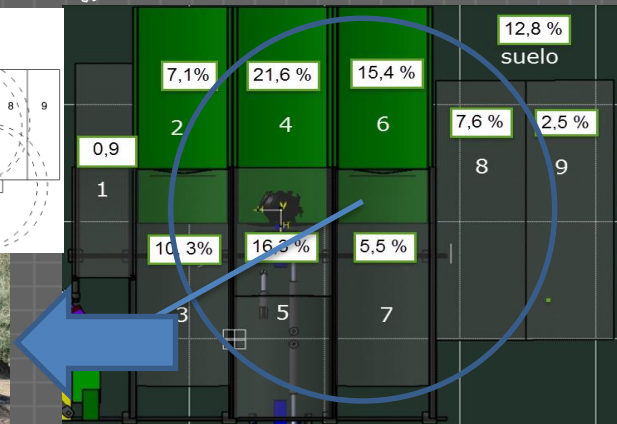
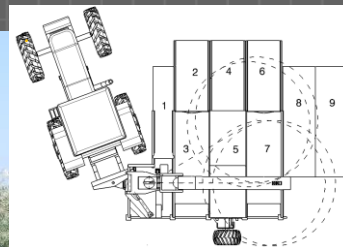
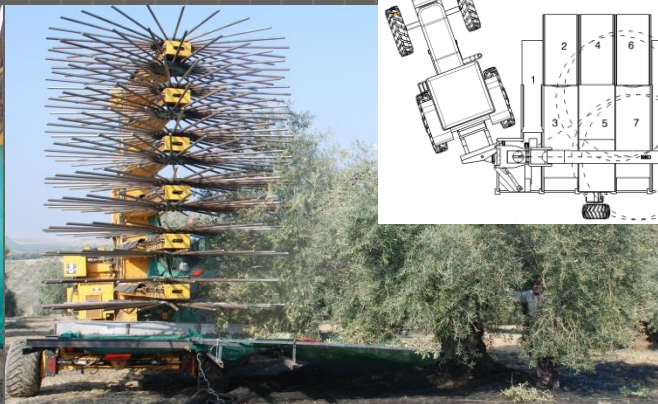
CS in olive trees?



Harvest efficiency?



Harvester?



- ✓ *Catch frame according to rod area*
- ✓ *Removal and catch efficiency acceptable*
- ✓ *Learning of the driver*
- ✓ *It is necessary a CATCH FRAME PROTOTYPE ADAPTED WITH PLATES*

TEST	Edo (%)	Ec (%)	Eh (%)
1	66,9	84,8	56,7
2	62,0	90,0	55,8
-----			
11	81,0	90,0	72,8
12	81,7	90,6	74,0
<b>Mean+SD</b>	<b>75,9±6,5</b>	<b>87,6±2,2</b>	<b>66,5±6,2</b>

## 2. CANOPY SHAKING BACKGROUND

CS in other crops



CS in olive trees?



Harvest efficiency?



Harvester?

### PARAMETERS

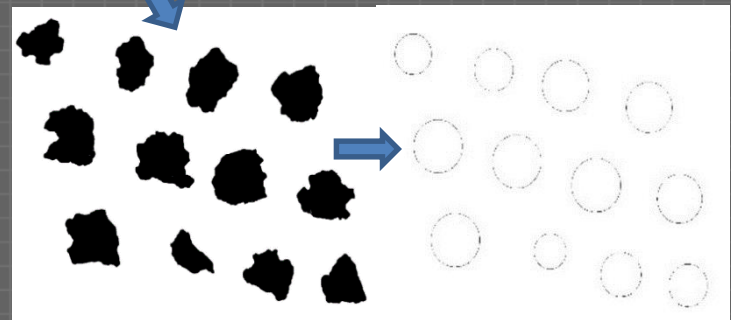
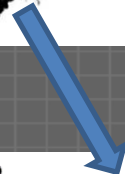
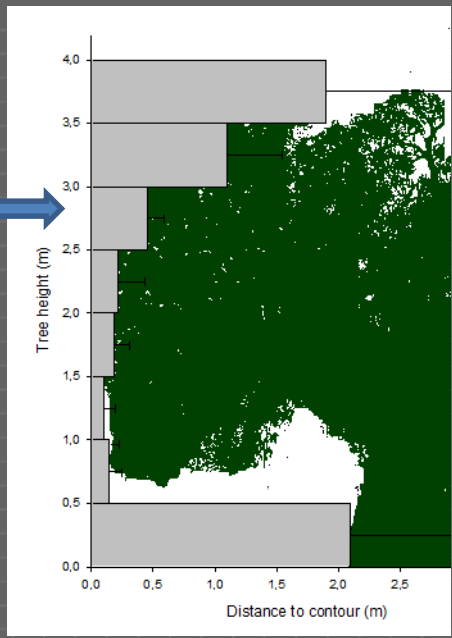
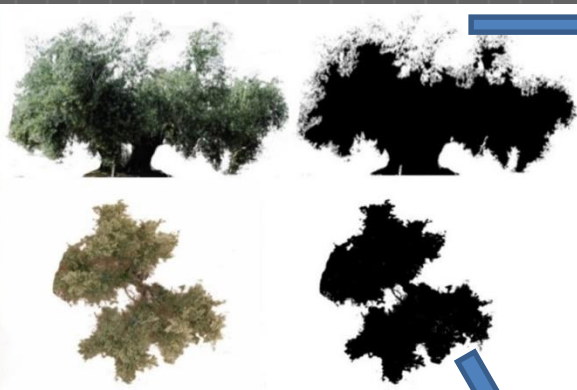
E removal (%)	92,4±3,9
E. catcj (%)	92,2±3,5
E harvest (%)	85,3±4,6
Debris (kg /kg fruit)	5,6±2,4
t (s/tree)	110

- ✓ *IT IS POSSIBLE THE INTEGRAL HARVESTING*
- ✓ *There is necessary a new harvester softer and adapted to orchard conditions*
- ✓ *There is necessary a tree training for the harvesting method*



### 3. HARVESTER DESIGN

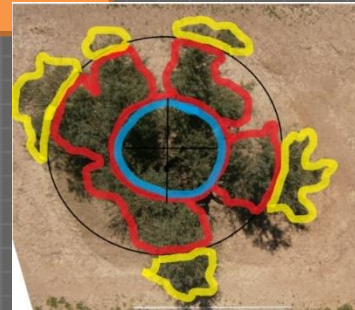
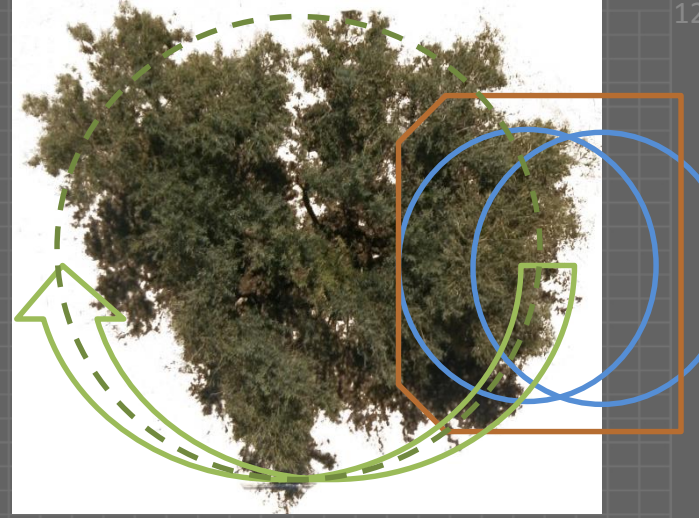
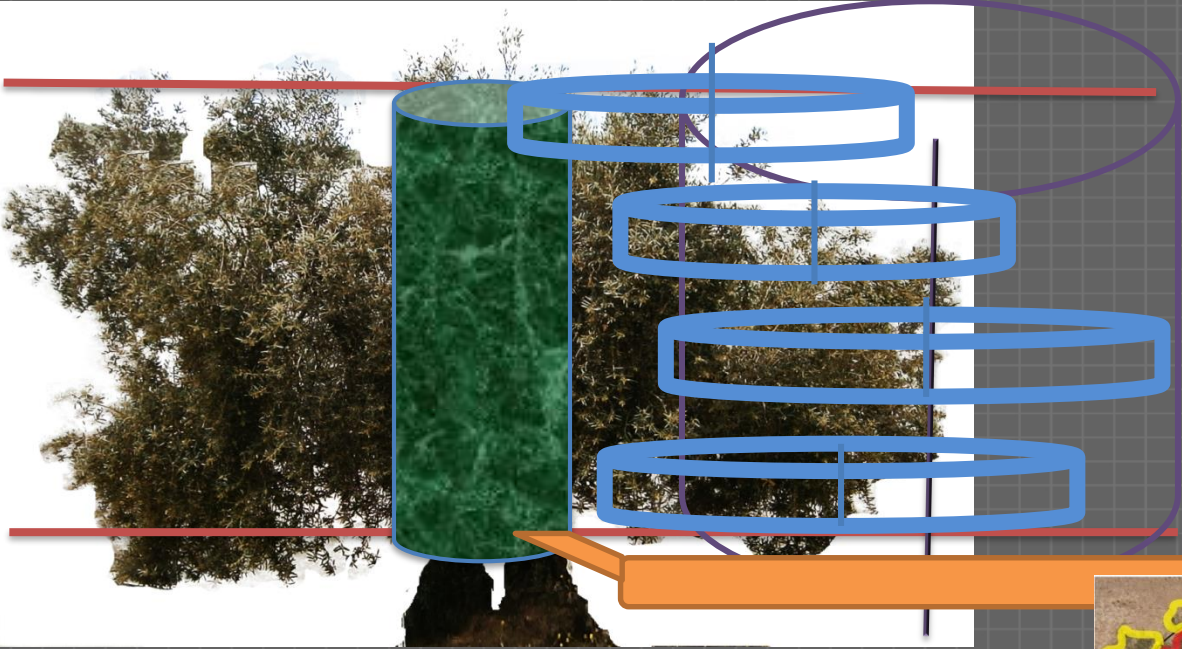
### TREES FEATURES





### 3. HARVESTER DESIGN

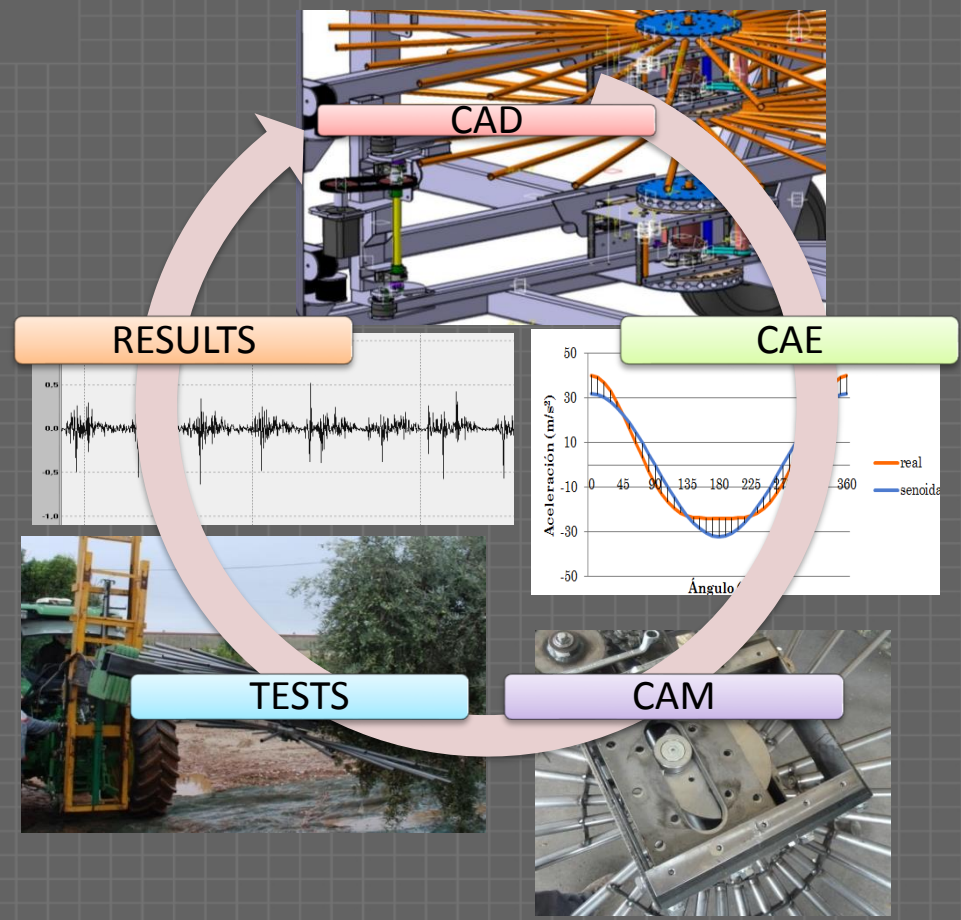
### TREES FEATURES





### 3. HARVESTER DESIGN

## SHAKER HEAD



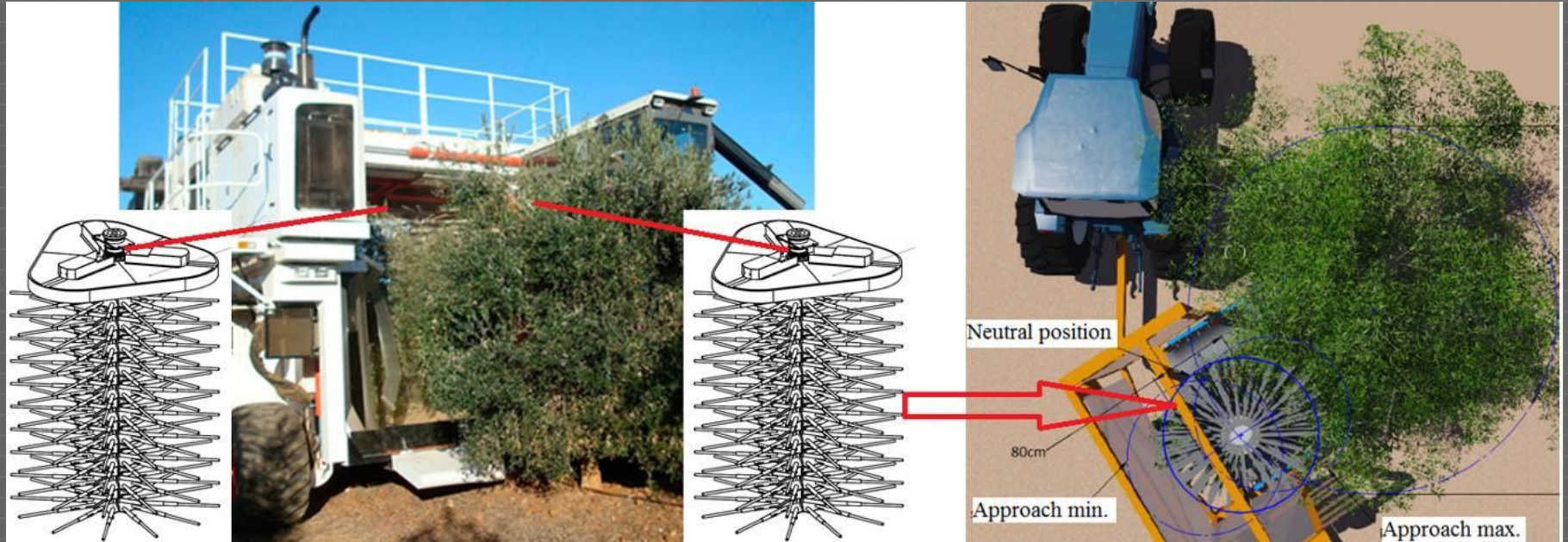
### 3. HARVESTER DESIGN

## HARVESTER



### 3. HARVESTER DESIGN

#### HARVESTER. arrangement





### 3. HARVESTER DESIGN

#### HARVESTER. arrangement

Meca<sup>o</sup>livar

16



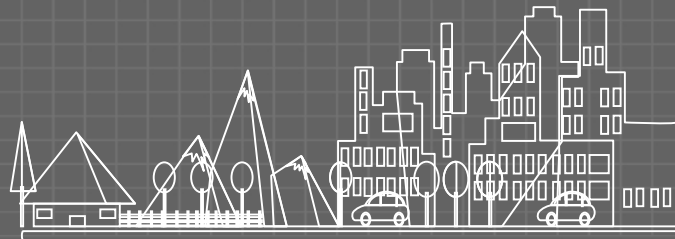


## CONCLUSIONS

*First precommercial **harvesters** have been developed introducing the **integral mechanization** in **traditional orchards** to maintain **the profitability thresholds** .*

*The **modernization process** in this traditional sector of agriculture will require a **great effort** taken into account that traditional olive growing is one of the world's oldest tree crops and is immersed in a culture that is resistant to change*

*The ongoing on a **commercial harvester** require a longer-term for tree training, machine improvements and cost optimization with a **close collaboration** between researchers, farmers and manufacturers.*





**Line 1**

**Canopy shaker harvesters**



**Line 2**

**Trunk shaker harvesters**



**Line 3**

**Automatization and pad system for trunk shakers**



**Line 4**

**Airblast sprayer**



**Line 5**

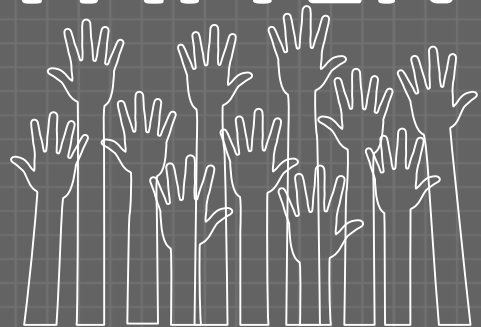
**Tractor mower and automated sprayer**



Thanks to:



# THANK YOU FOR YOUR ATTENTION



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