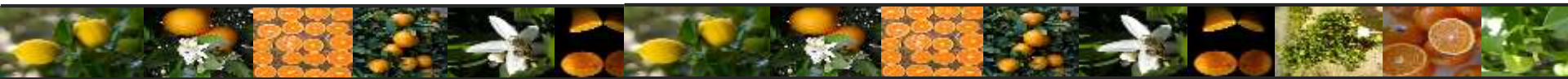
Comité de Cítricos Chile

# Desarrollo de un sistema de conducción en cítricos para optimizar la eficiencia productiva y calidad de la fruta



Los cítricos se caracterizan por un **desarrollo foliar abundante** con varias ramas principales que sostienen las ramas de producción, por lo que la **optimización de la luz al interior de la copa del árbol se reduce considerablemente** interfiriendo en la calidad, productividad y uso de mano de obra del cultivo.

# ¿POR QUÉ UN SISTEMA DE CONDUCCIÓN?

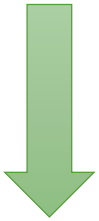
- Dar forma y estructura
- Favorecer penetración de luz.
- Balance entre el desarrollo vegetativo y productivo
- Regulación de la cosecha
- Mejorar Producción
- Mejorar Calidad de Fruta
- Promover renovación anual de madera productiva
- Mantener dimensiones del árbol (facilita labores).

# Forma y estructura

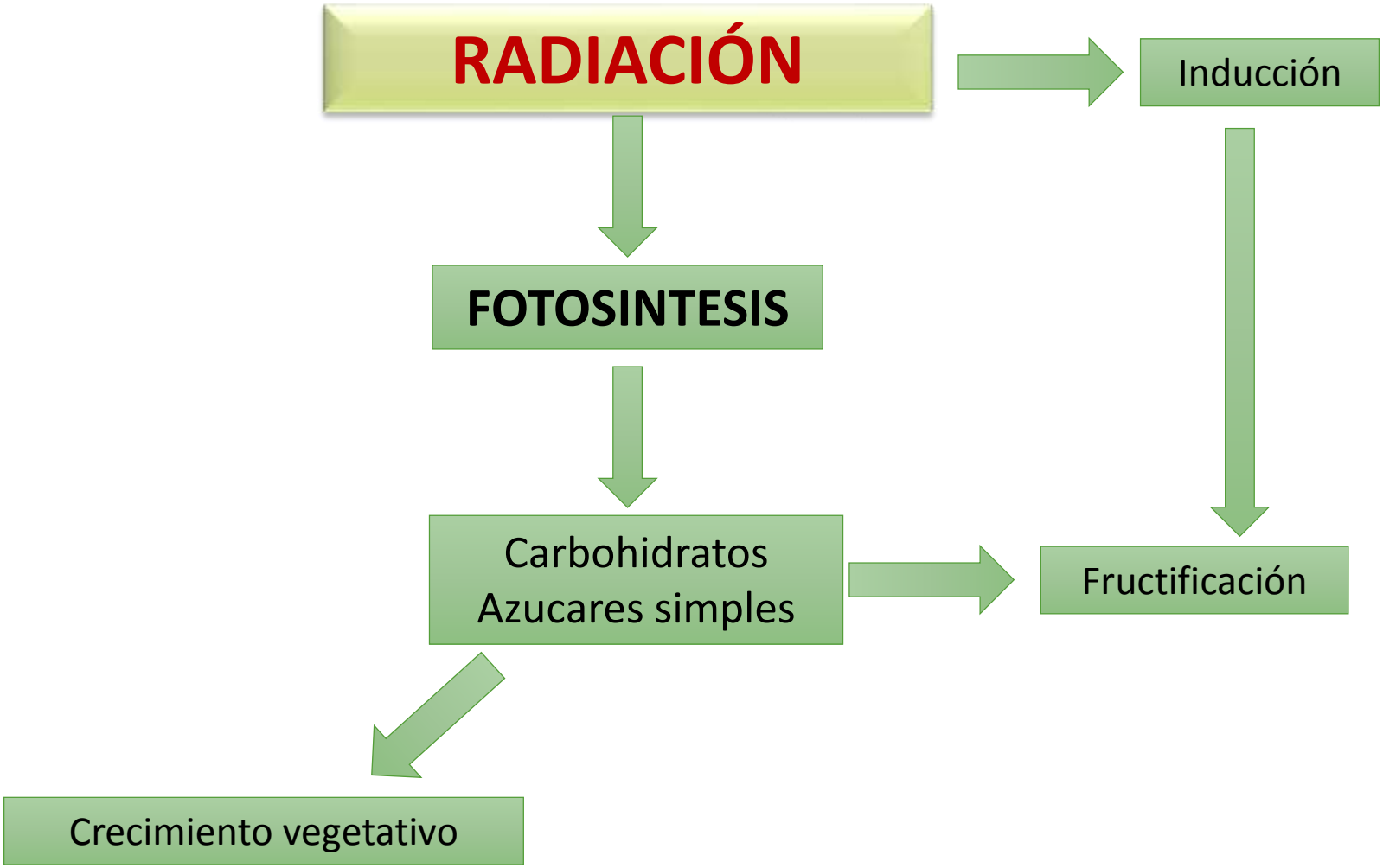
# Mantener tamaño del árbol

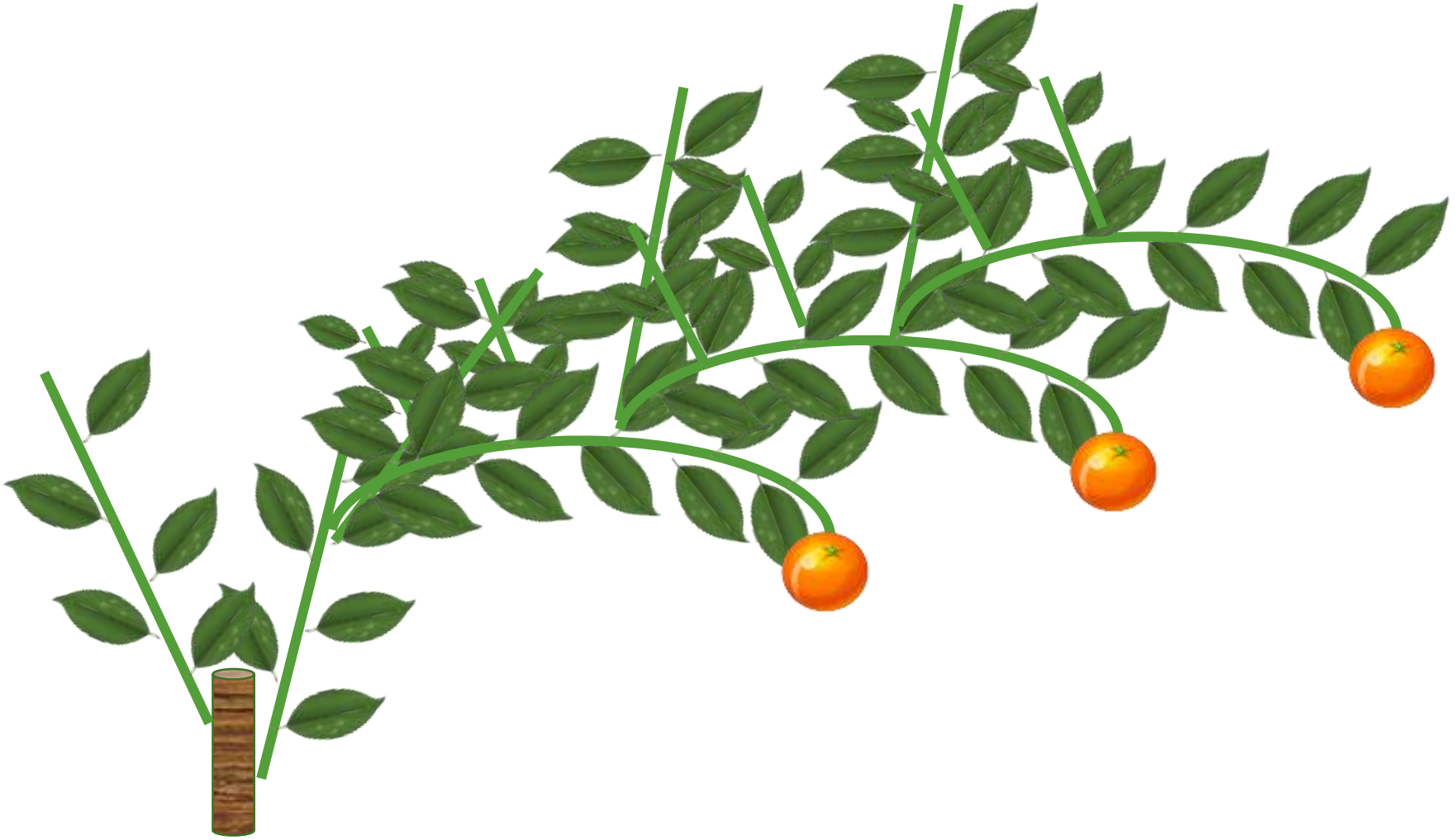
Altura

Control crecimiento vegetativo



Aumento iluminación al interior de la copa

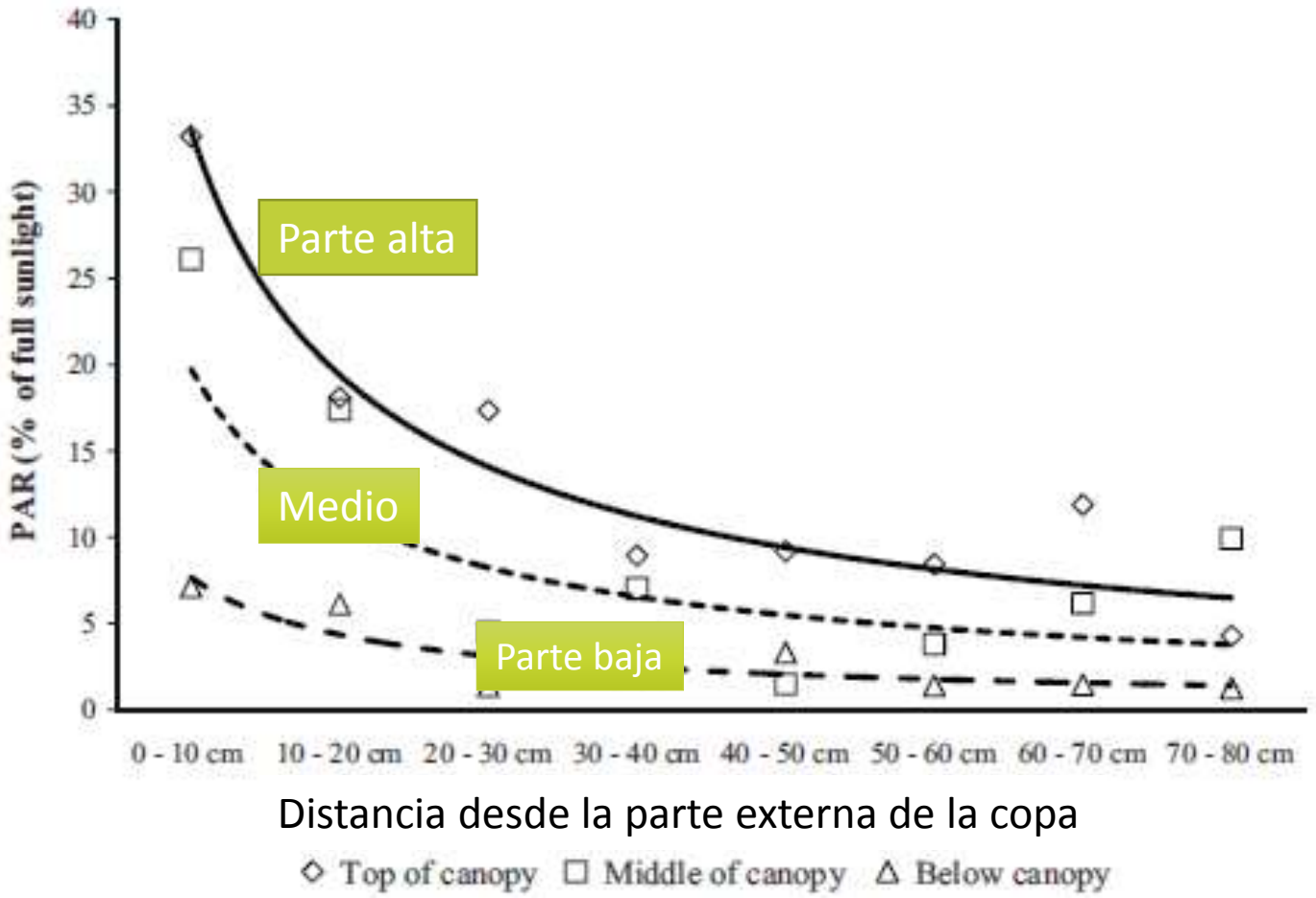

RADIACIÓN
Inducción
FOTOSINTESIS
Carbohidratos
Azucares simples
Fructificación
Crecimiento vegetativo



# Favorecer entrada de luz

| Sistema de Poda | % de Fruta Afuera |
|---|---|
| P. Oriente | 45,43 a |
| P. Poniente | 48,73 a |
| Epsylon | 49,45 a |
| Copa | 49,74 a |

**Variación del porcentaje de radiación PAR captada al ser medida a distintas distancias desde el centro de la copa (Cronje et al., 2011) .**



**2000 a 2500 µmol/m²s**

**400-450 µmol/m²s**

**Relación hoja/fruto: 45**
**en Washington Navel**

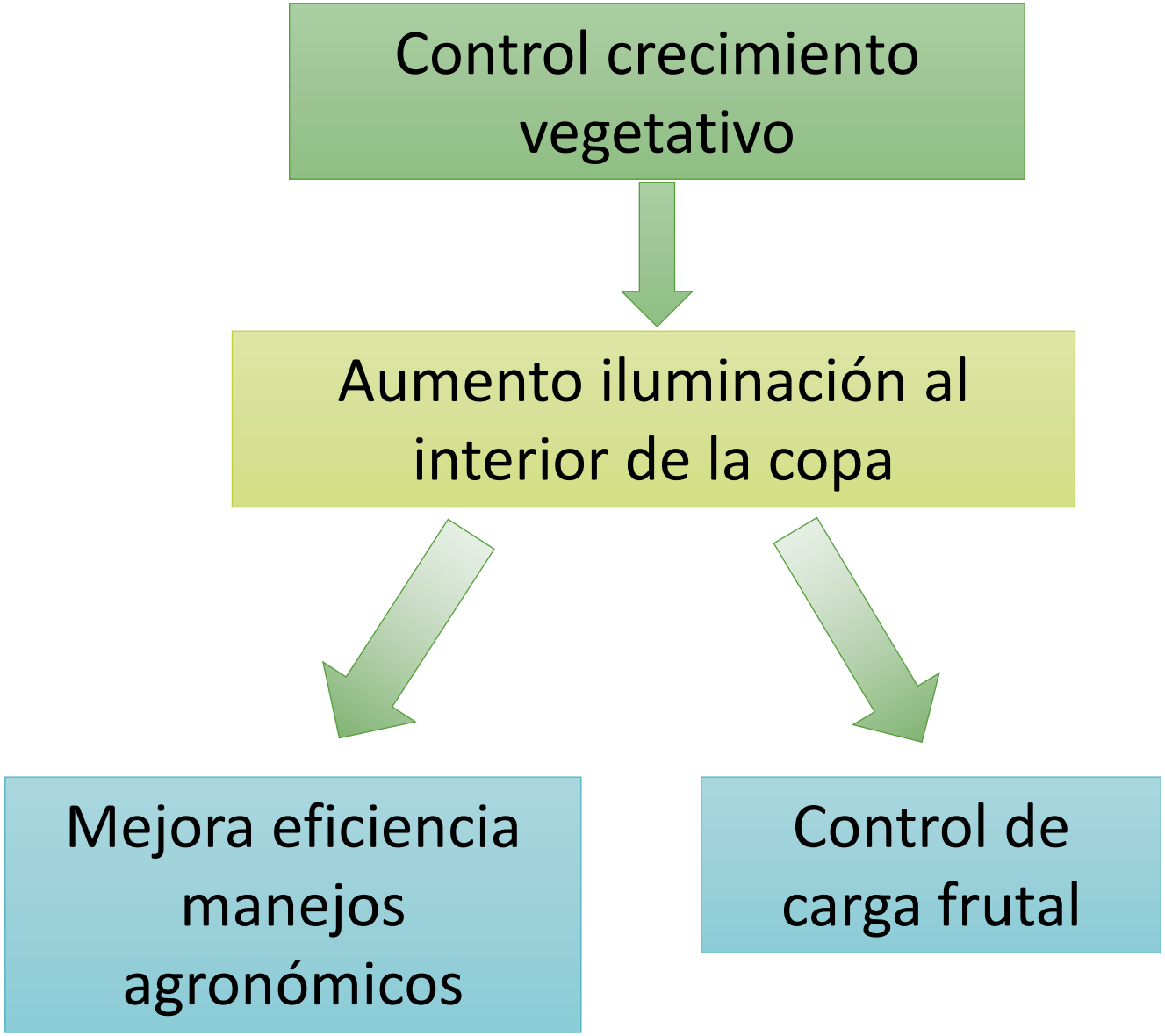
**Alto contenido de clorofila**
**Alta tolerancia a la sombra**

# Temperatura

Luz y temperatura son **interdependientes**, están correlacionados positivamente con el nivel de radiación.

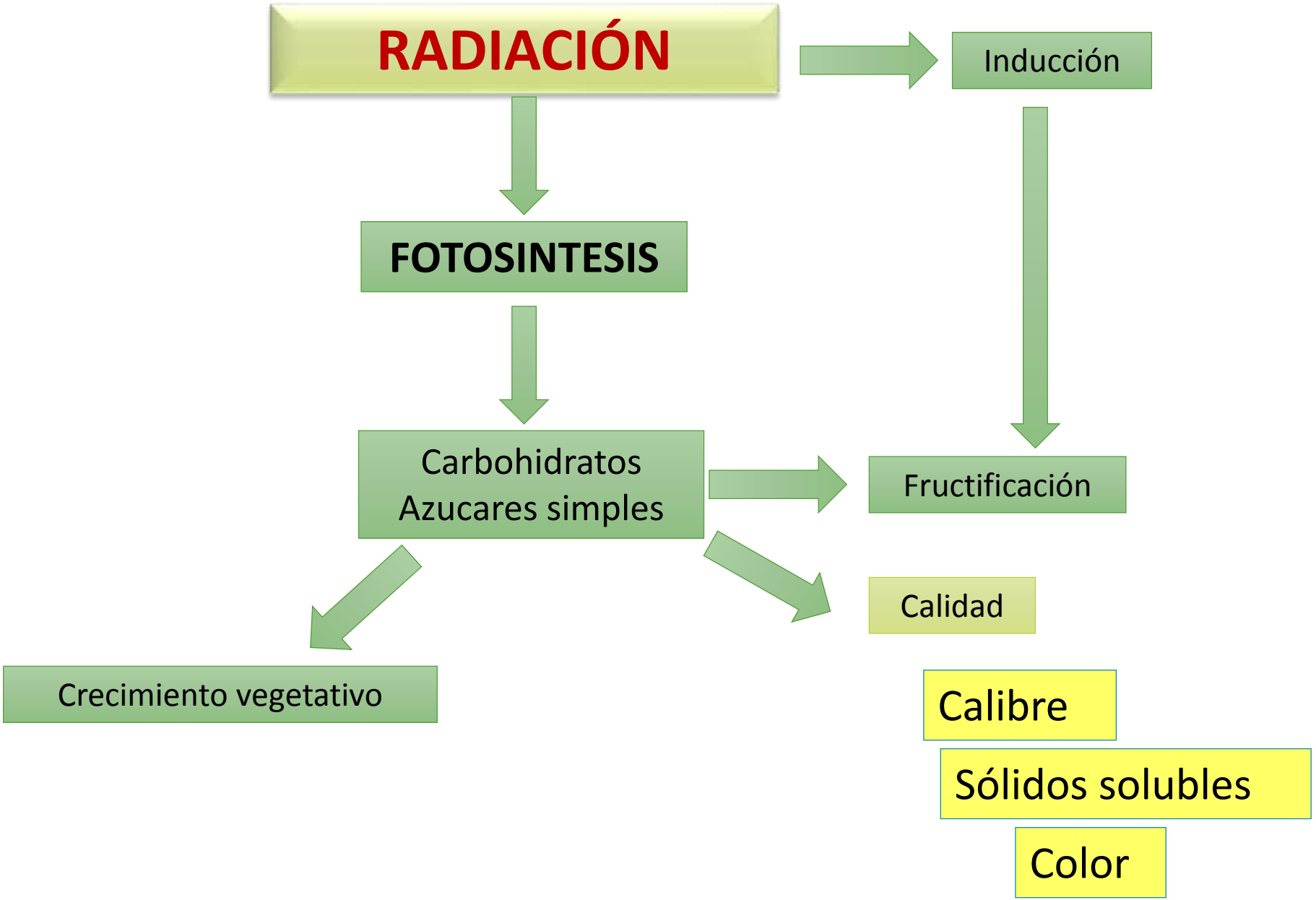
La temperatura es indudablemente el factor climático más importante que afecta el desarrollo, productividad y maduración de los frutos cítricos (Goldschmidt, 1997, 2000; Kaleem et al, 2010; Reuther, 1973; Spiegel-Roy and Goldschmidt, 1996; Weeler et al, 2000).

| Zona | Grados Dia |
|---|---|
| Centro | 1100 |
| Norte Chico | 1600 |
| Nelspruit | 2600 |
| Valencia | 1600 |
| Revhobot | 2600 |
| Florida | 3400 |
| California | 2000 |


Control crecimiento vegetativo
Aumento iluminación al interior de la copa
Mejora eficiencia manejos agronómicos
Control de carga frutal

Reducción de plagas

Control de añerismo


RADIACIÓN
Inducción
FOTOSINTESIS
Carbohidratos
Azucares simples
Fructificación
Calidad
Crecimiento vegetativo
Calibre
Sólidos solubles
Color

**Mejora tamaño y calidad del fruto**

# COMO DAR FORMA A LOS ARBOLES

# TRADICIONAL O COPA

Imagen:  Citrus UC

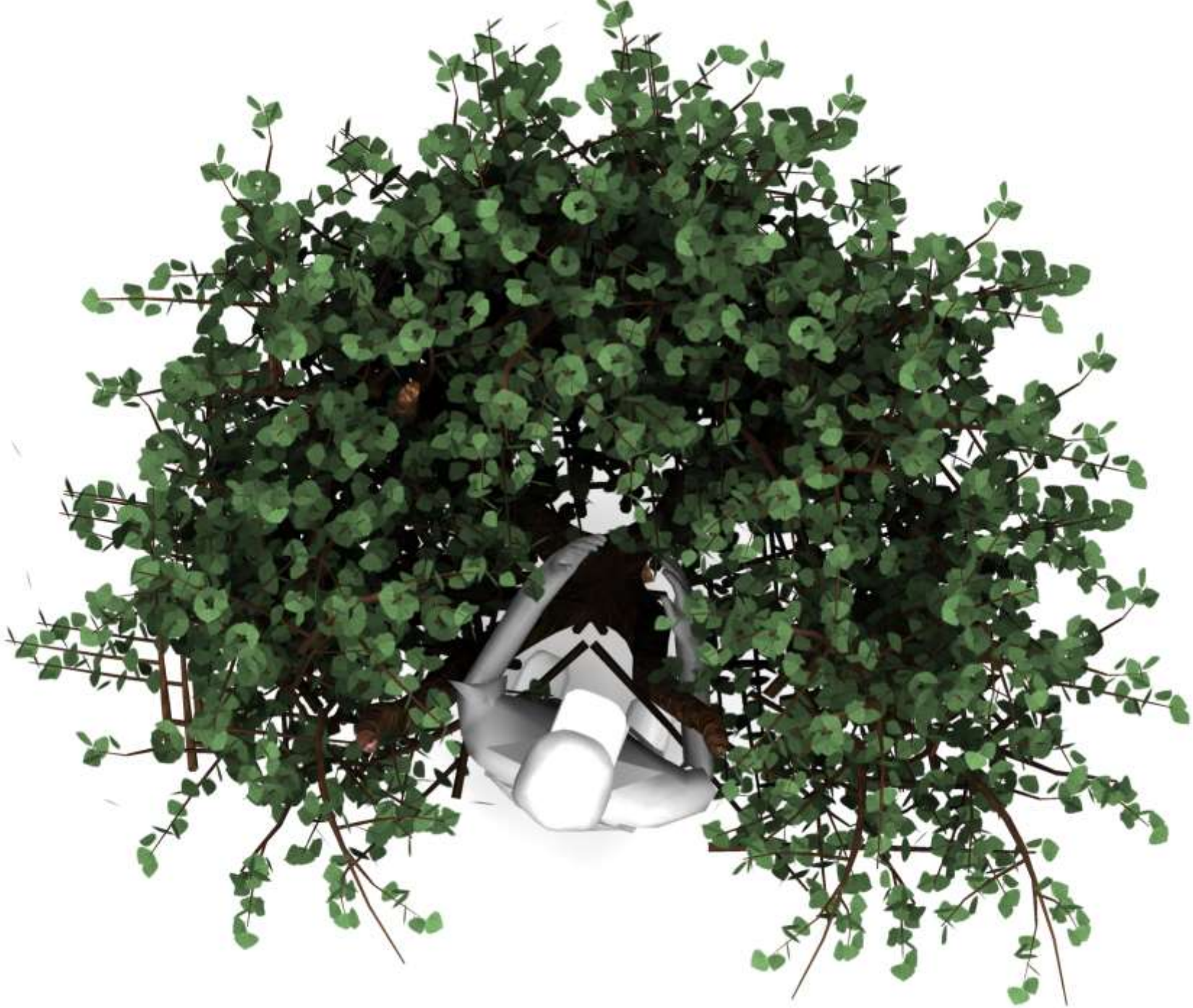
# TRADICIONAL O COPA

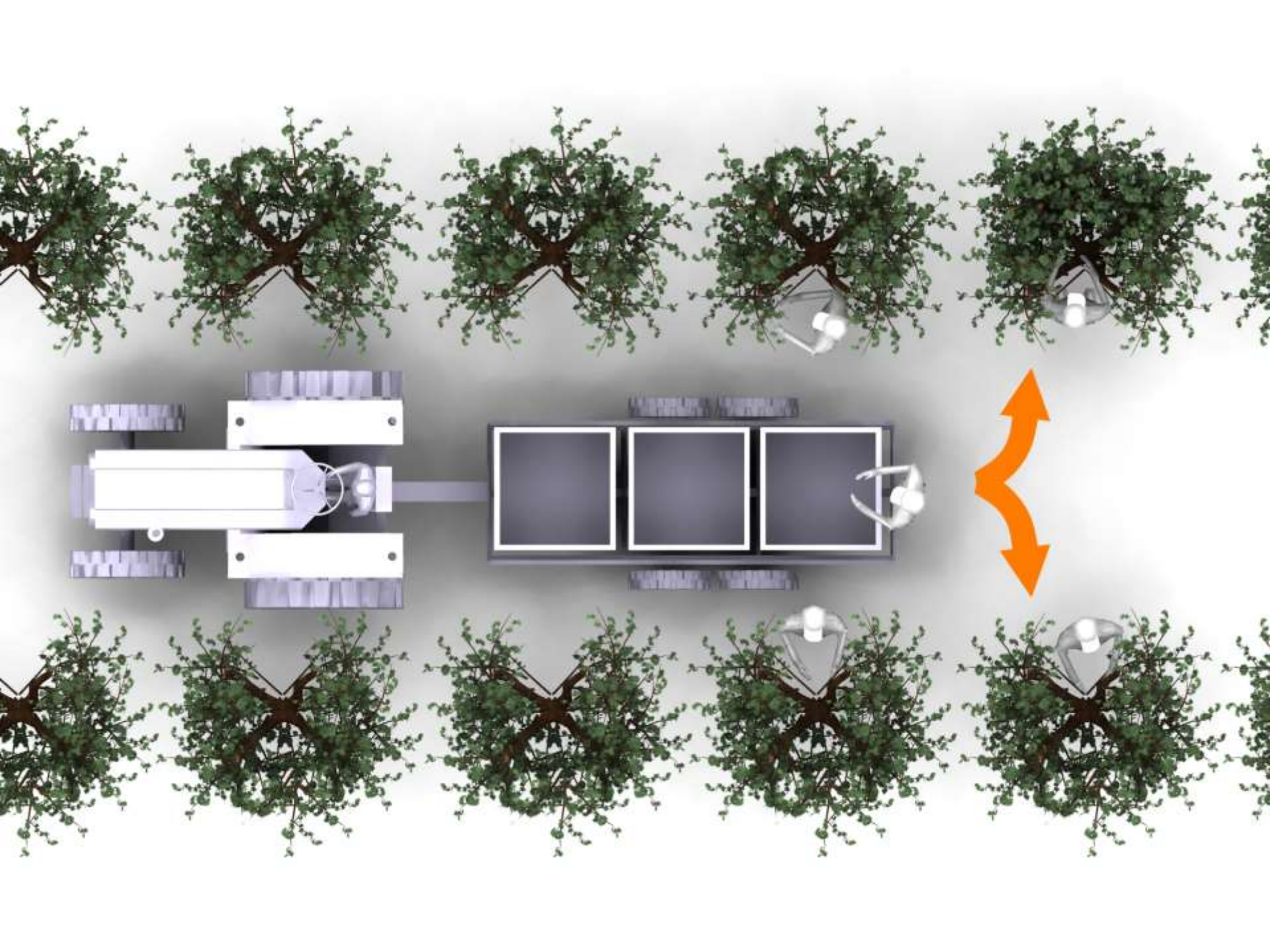
# EPSILON

Imagen: Citrus UC

# PUERTA

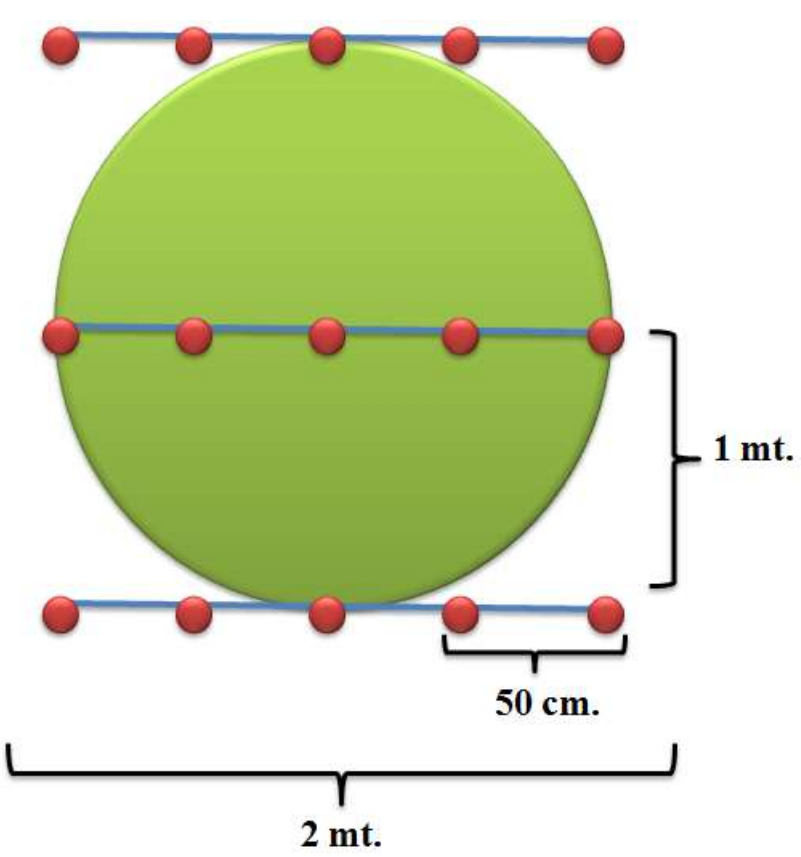
Imagen: Citrus UC

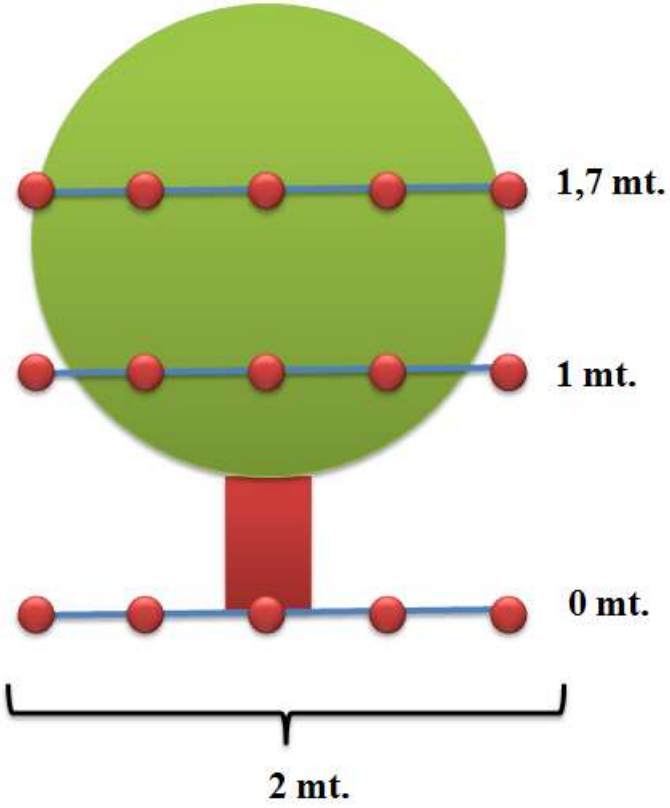




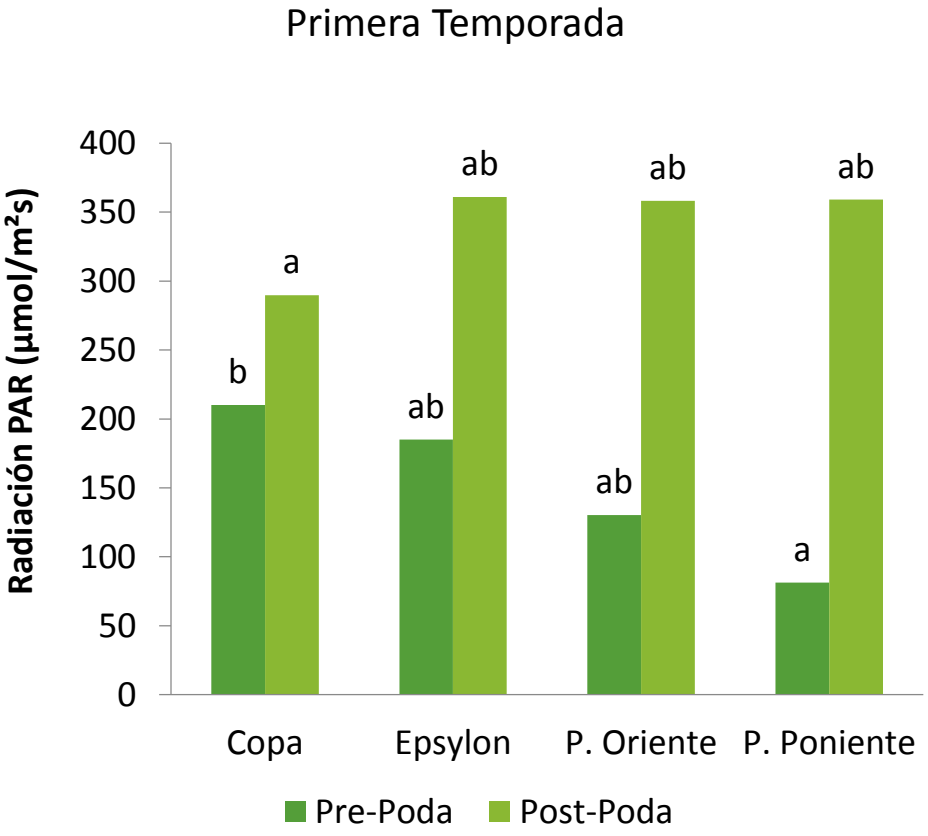
# LUZ → RADIACIÓN

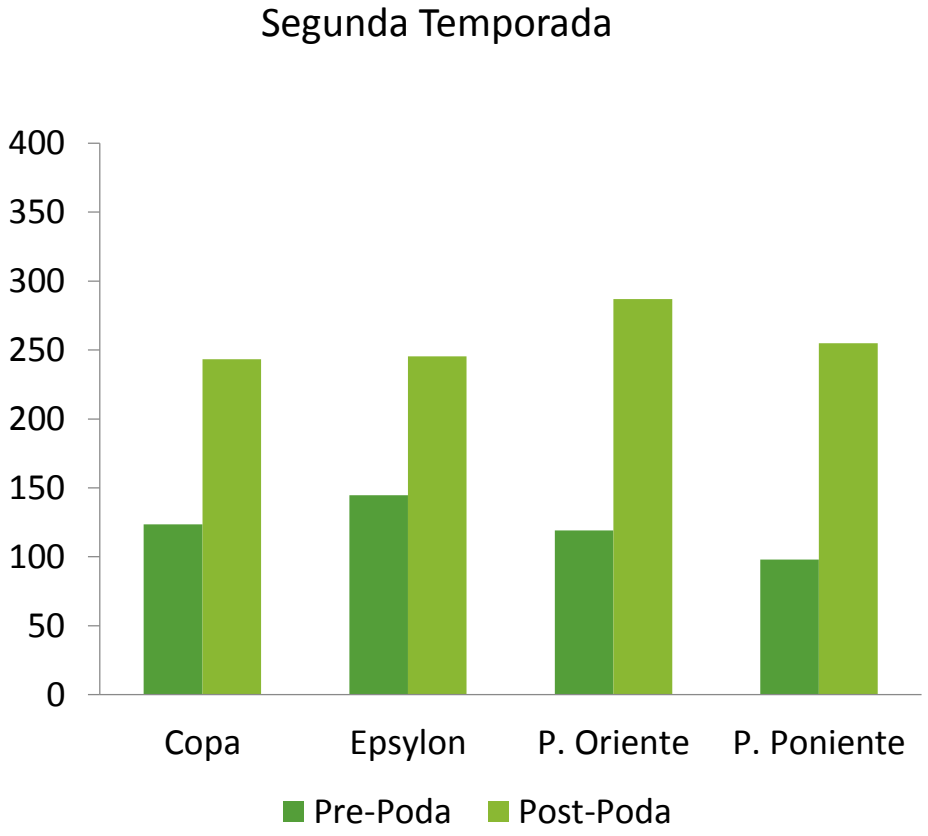
# Medición de Radiación



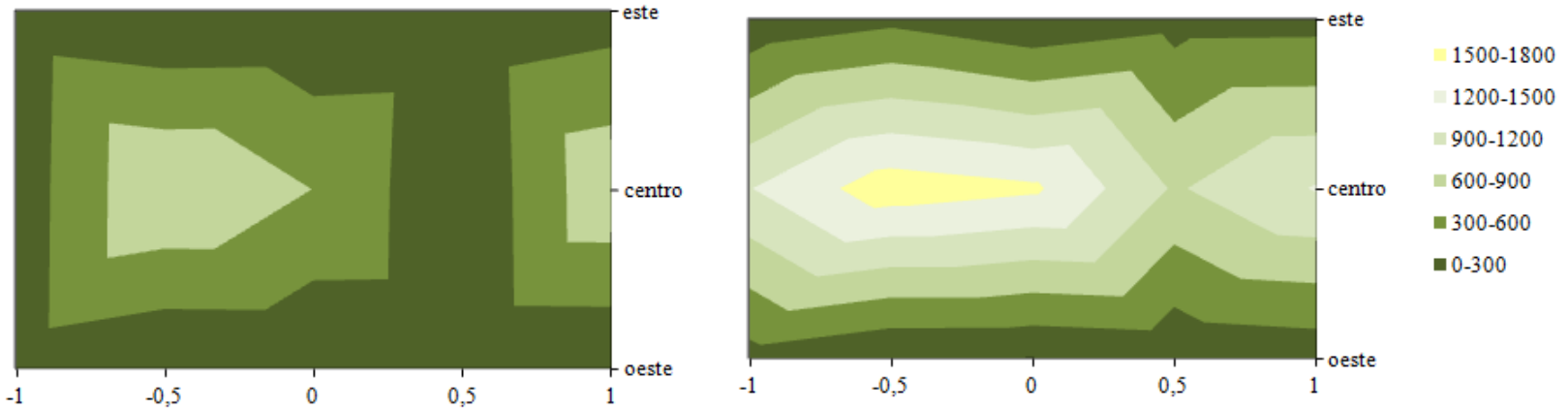
# Medición de radiación PAR (µmol/m2s) promedio pre-poda y post-poda (agosto) en los distintos sistema de poda en **Clemenules**.



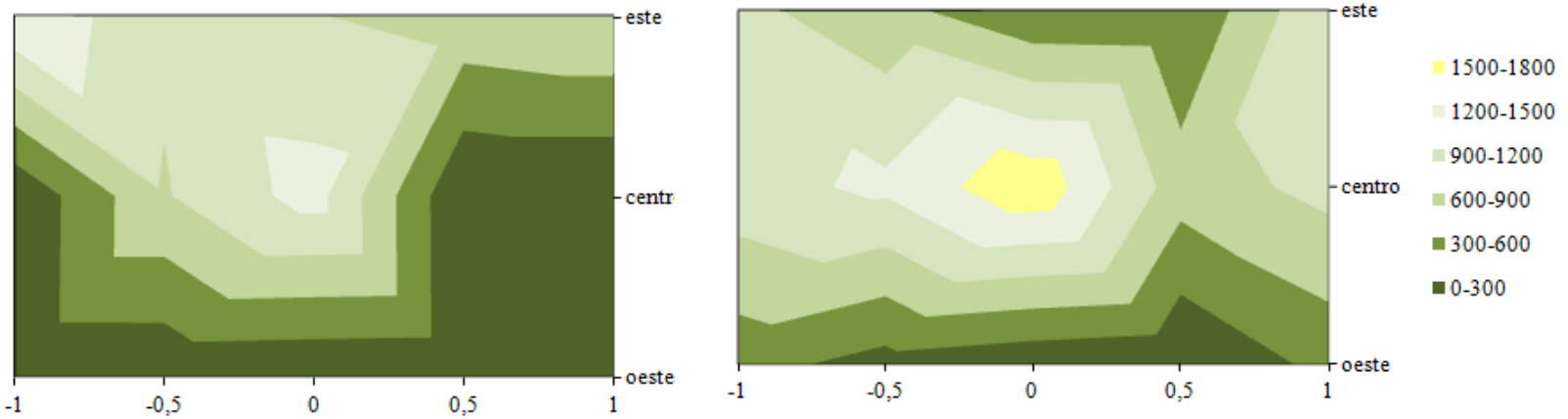



# Clemenules - Copa

Pre-Poda

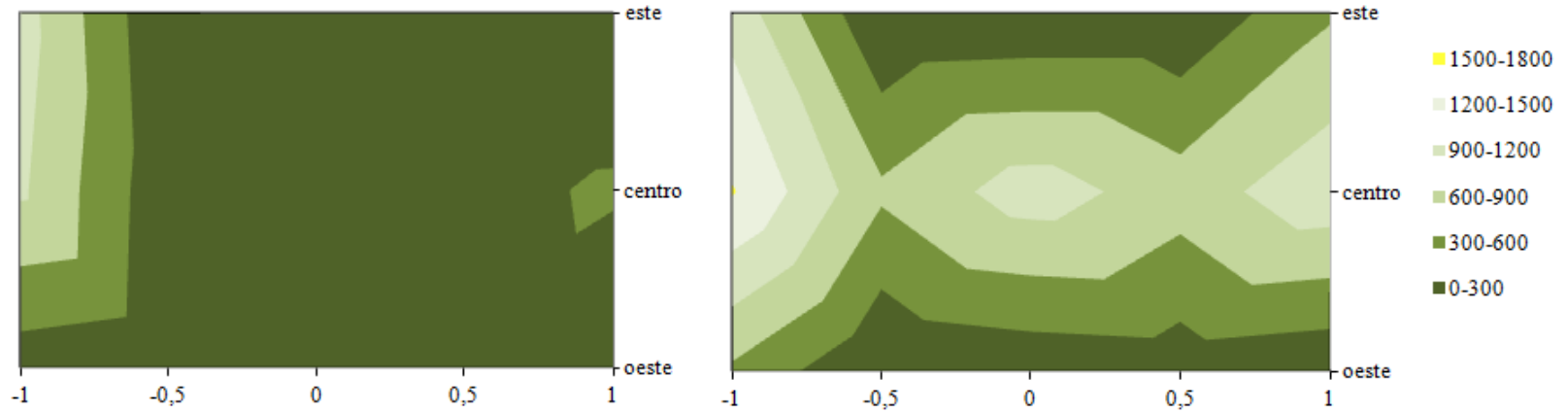



Post-Poda

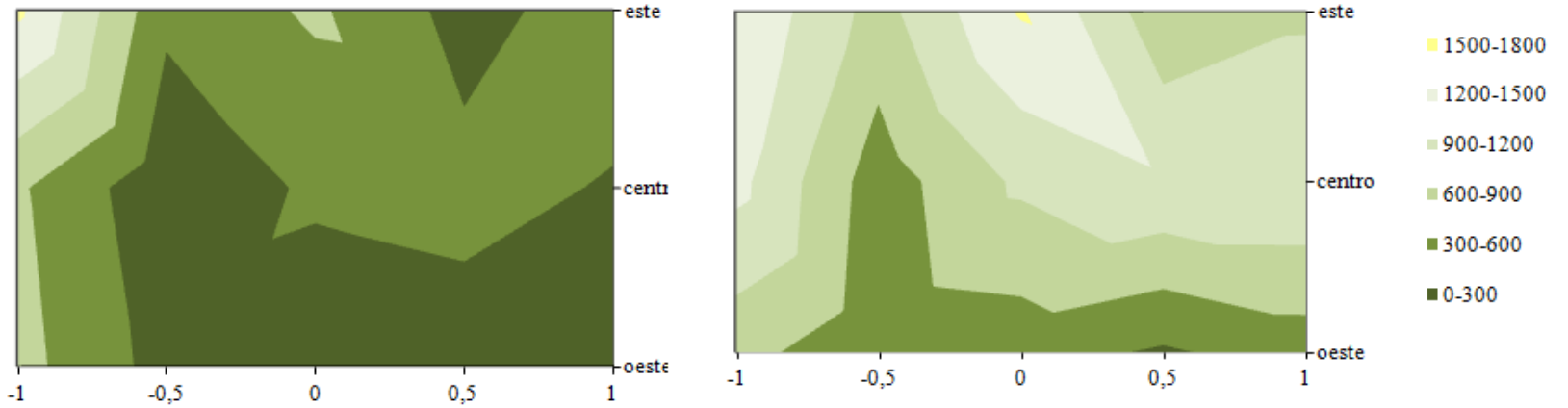


# Clemenules - Epsylon

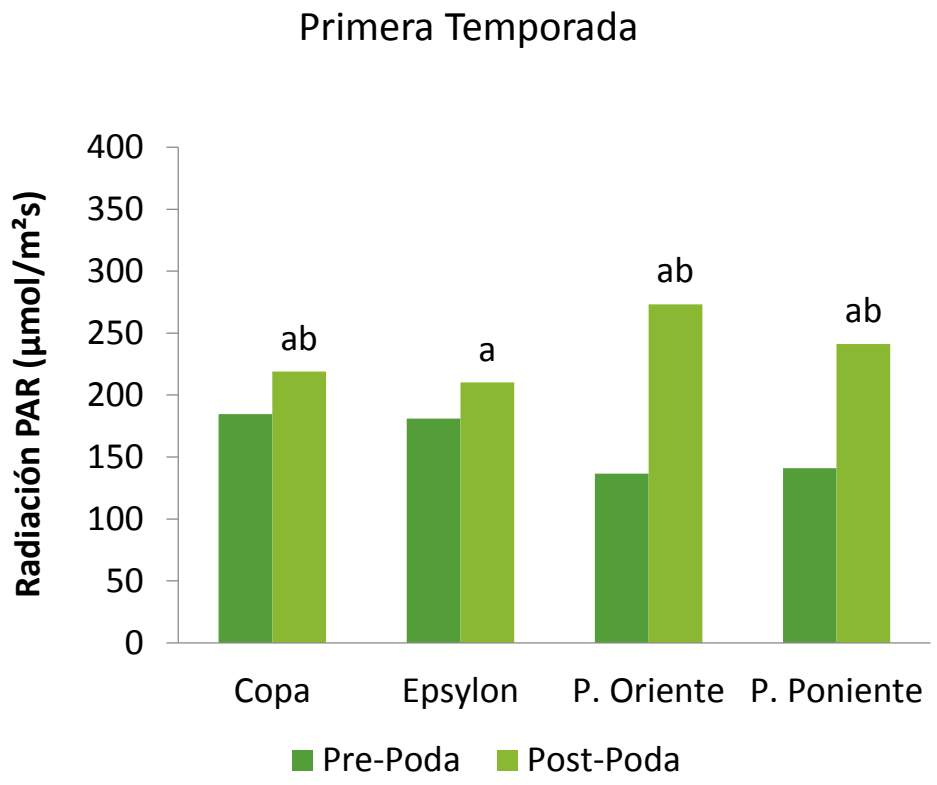
Pre-Poda

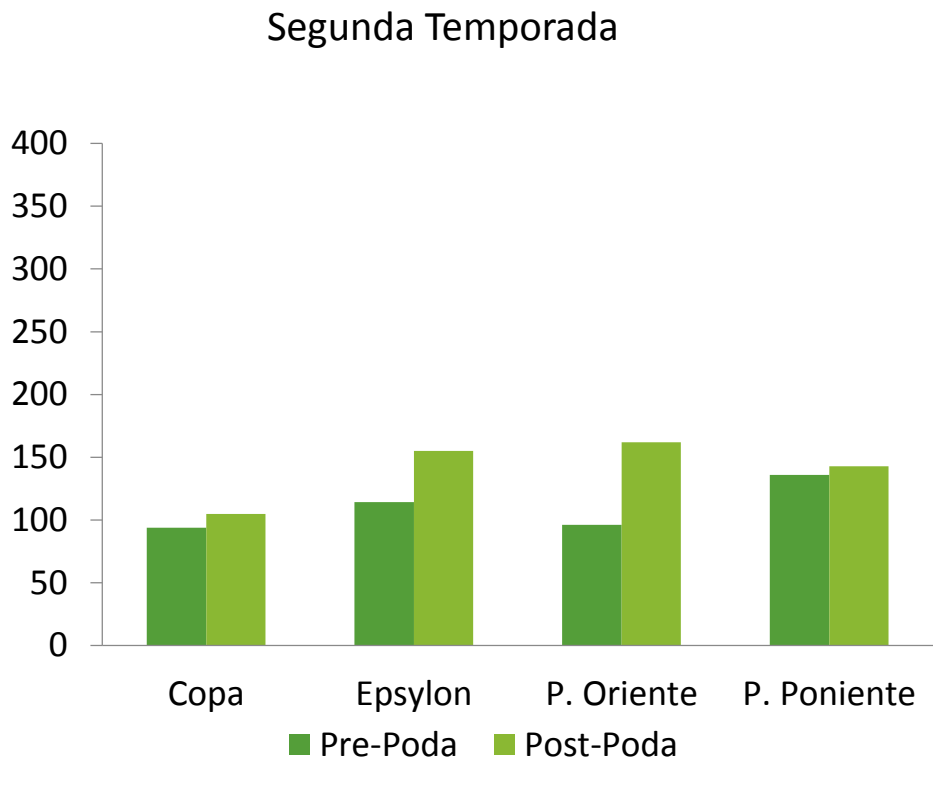



Post-Poda

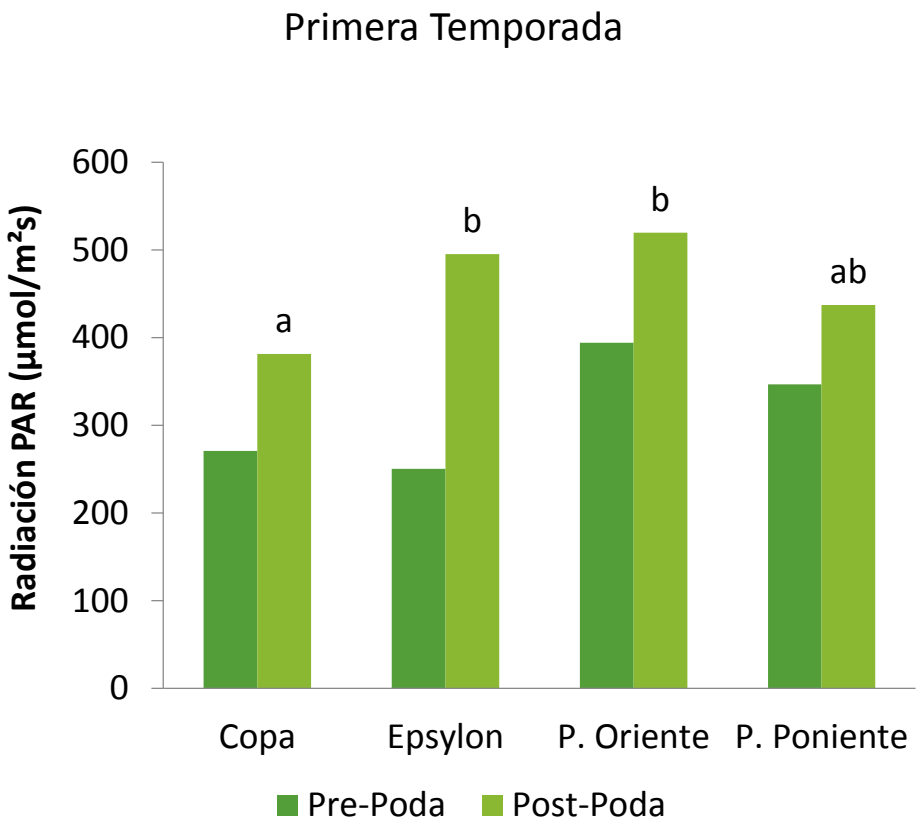


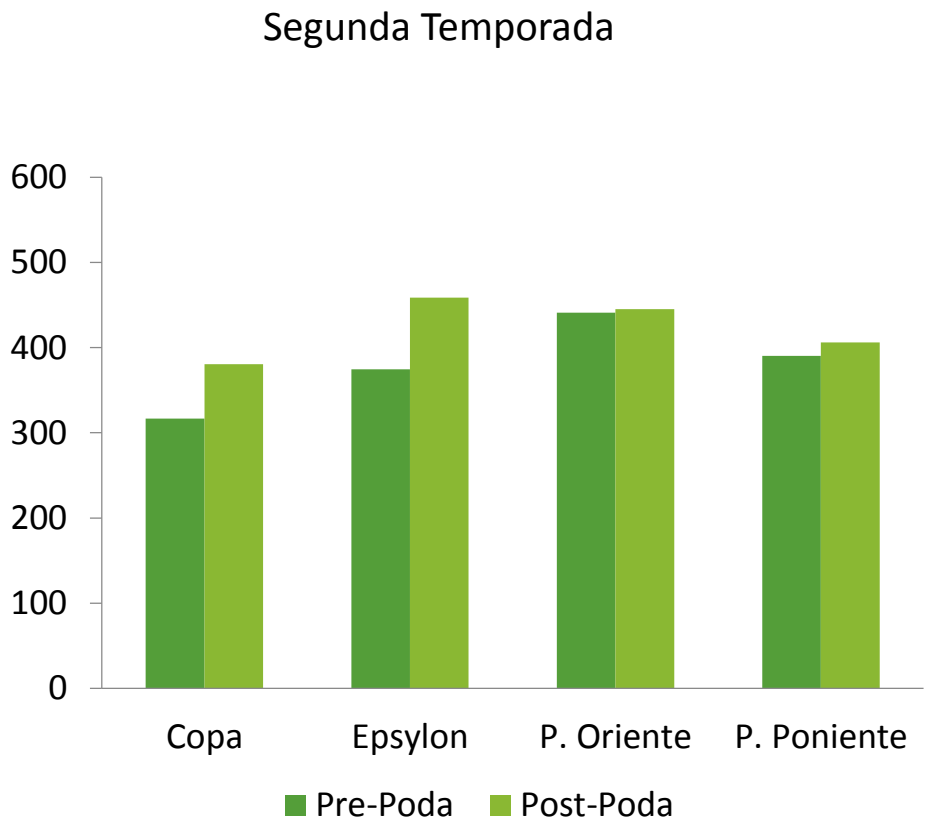
# Medición de radiación PAR (µmol/m2s) promedio pre-poda y post-poda (agosto) en los distintos sistema de poda en **W. Murcott**.



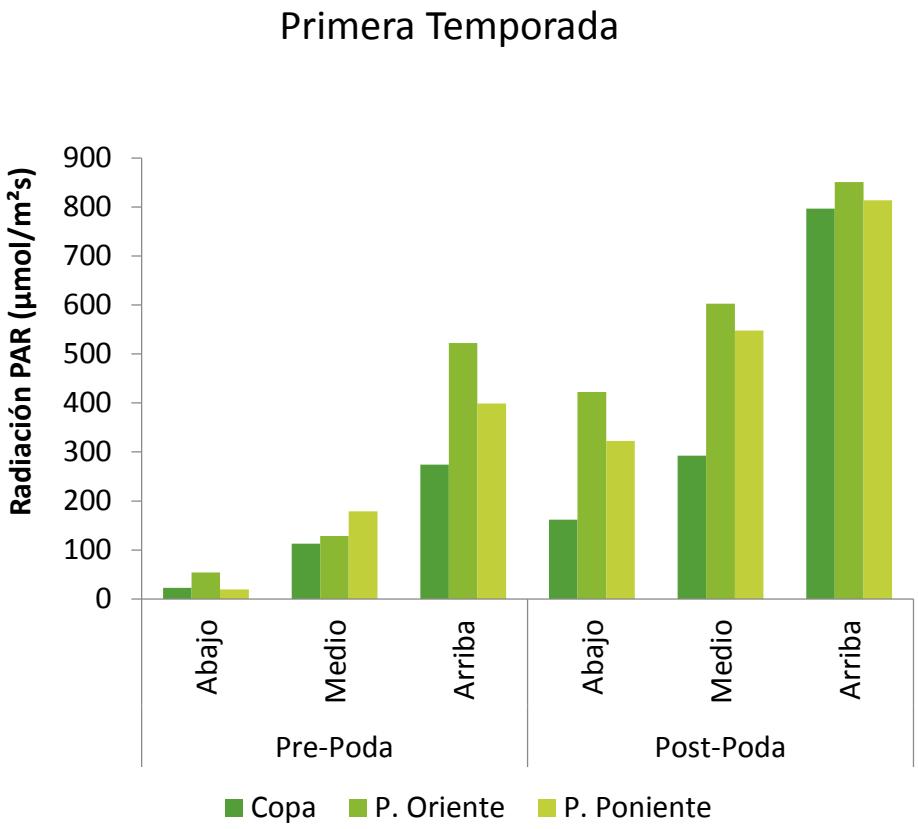



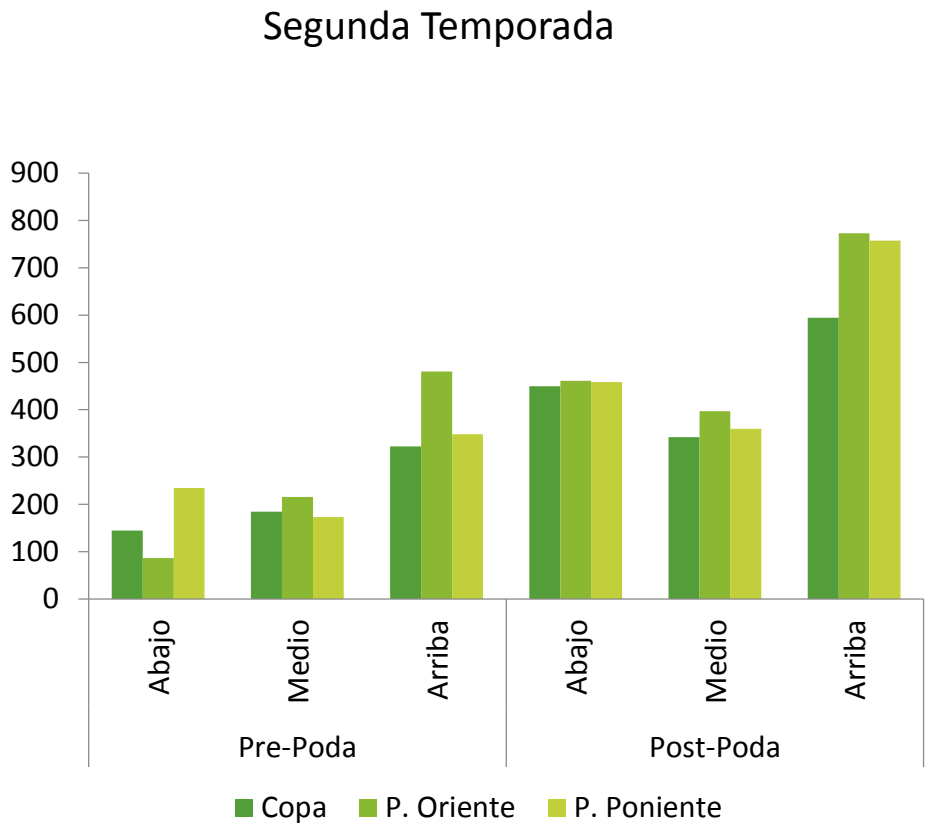
# Medición de radiación PAR (µmol/m2s) promedio pre-poda y post-poda (agosto) en los distintos sistema de poda en **P. Washington**.



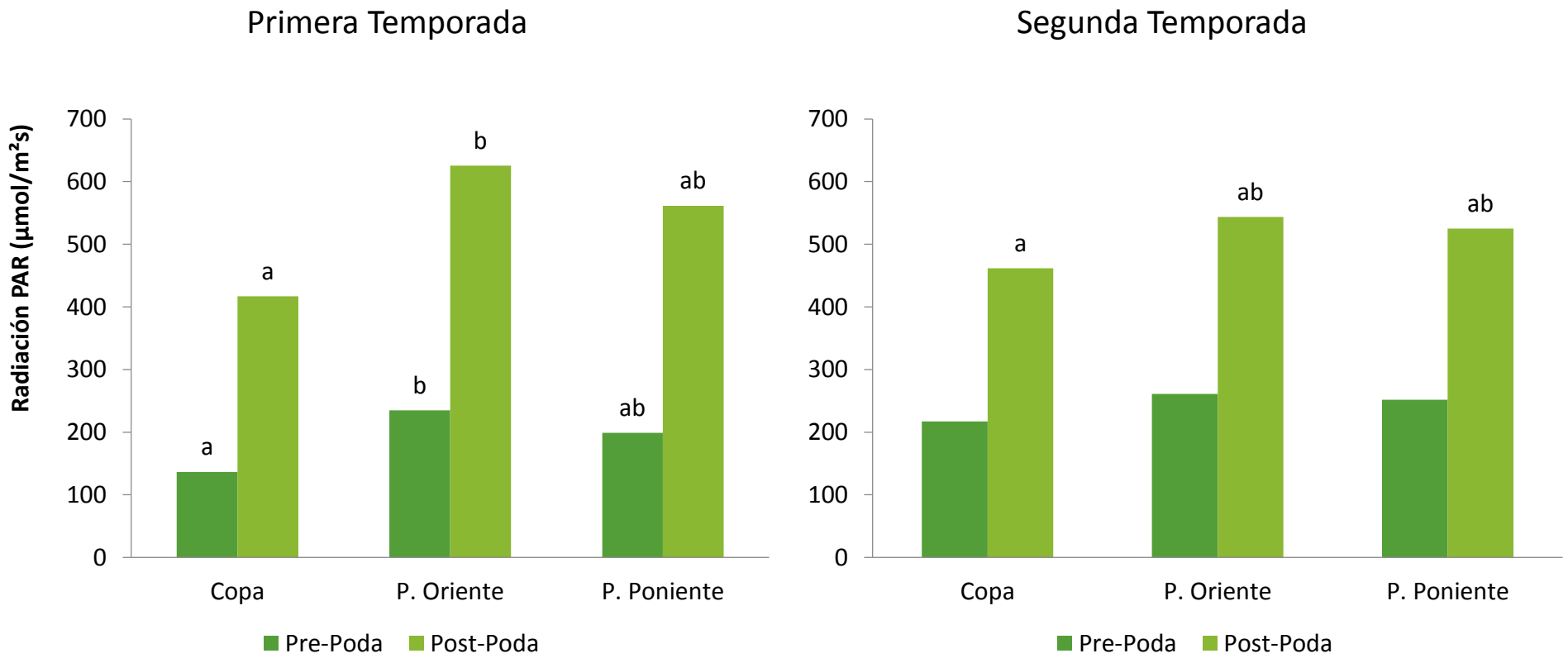



# Medición de radiación PAR (µmol/m2s) pre-poda y post-poda (agosto) en los distintos sistema de poda en **Eureka Frost**



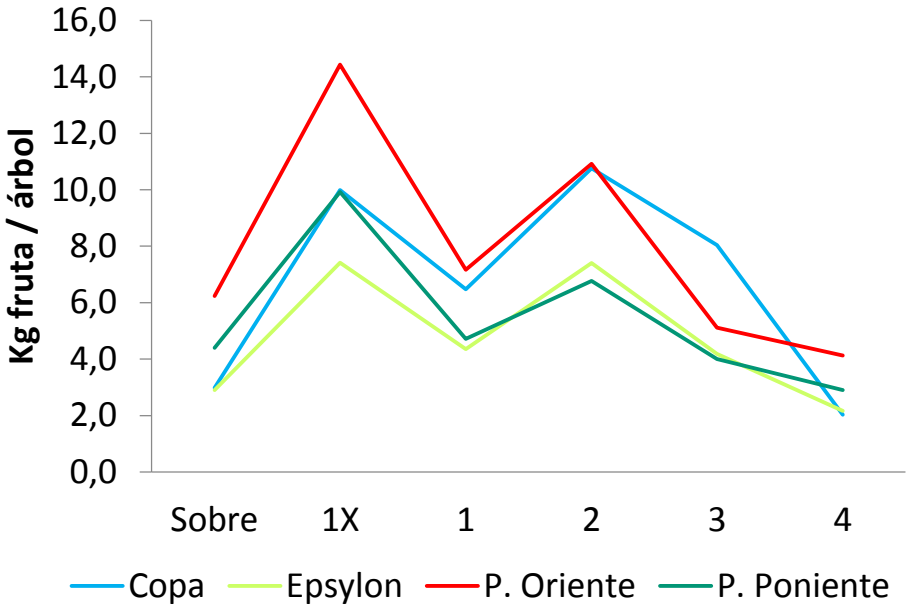



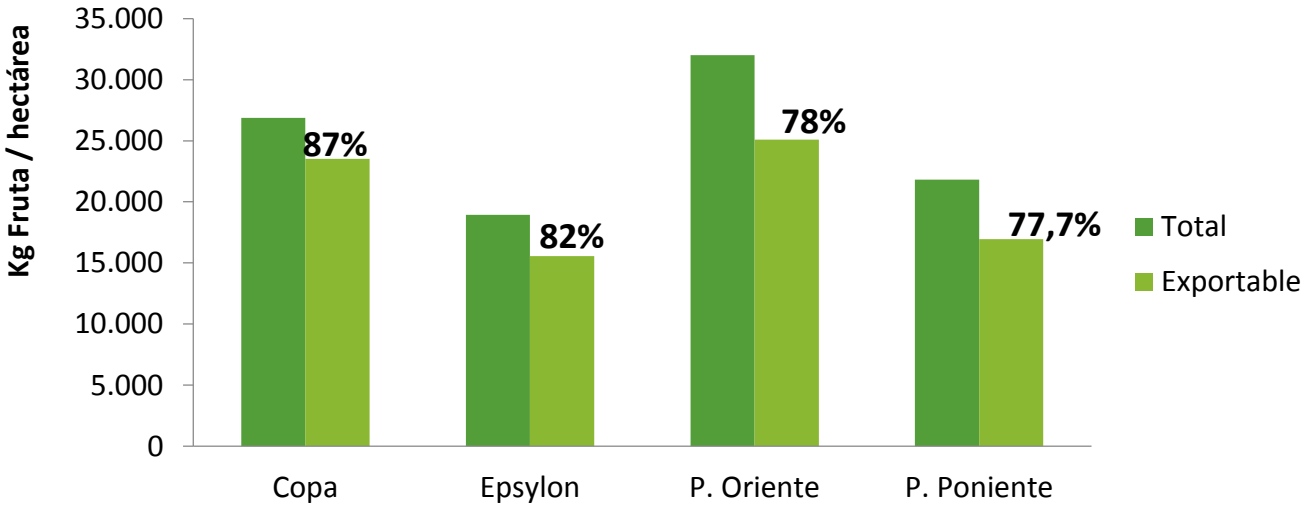
# Medición de radiación PAR (µmol/m2s) promedio pre-poda y post-poda (agosto) en los distintos sistema de poda en **Eureka Frost**



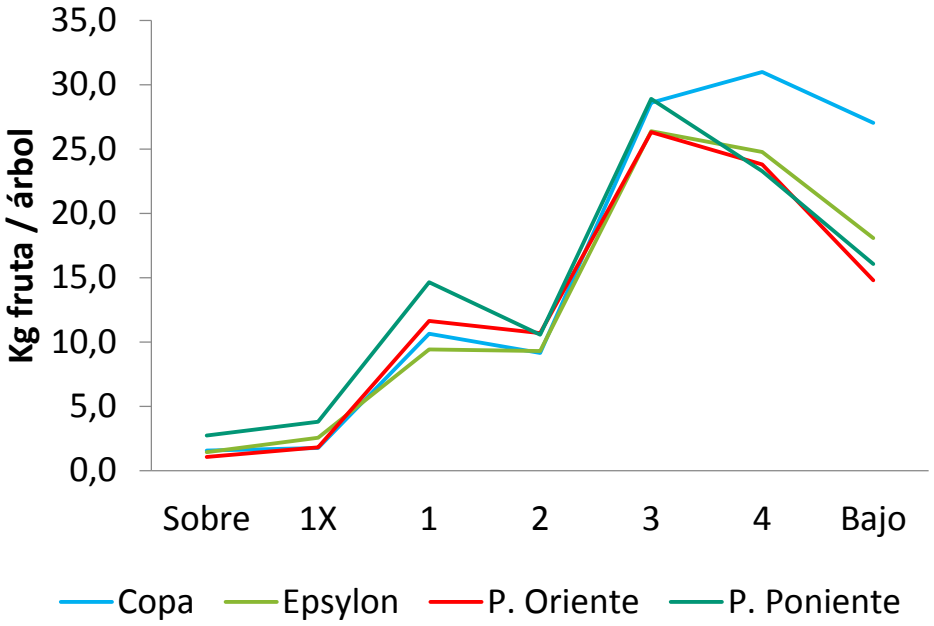
# PRODUCTIVIDAD

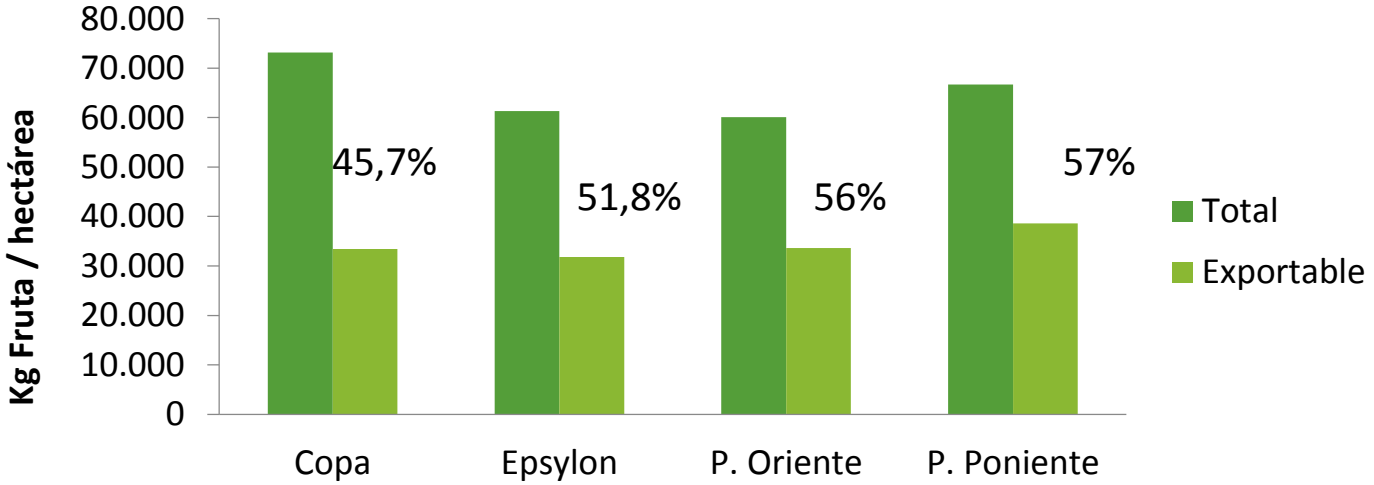
# Clemenules Primera Temporada



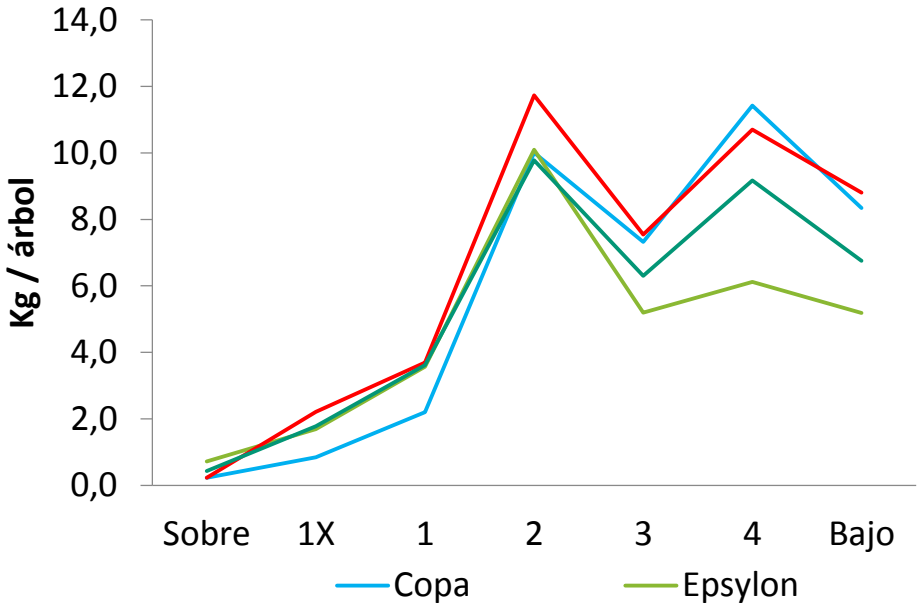



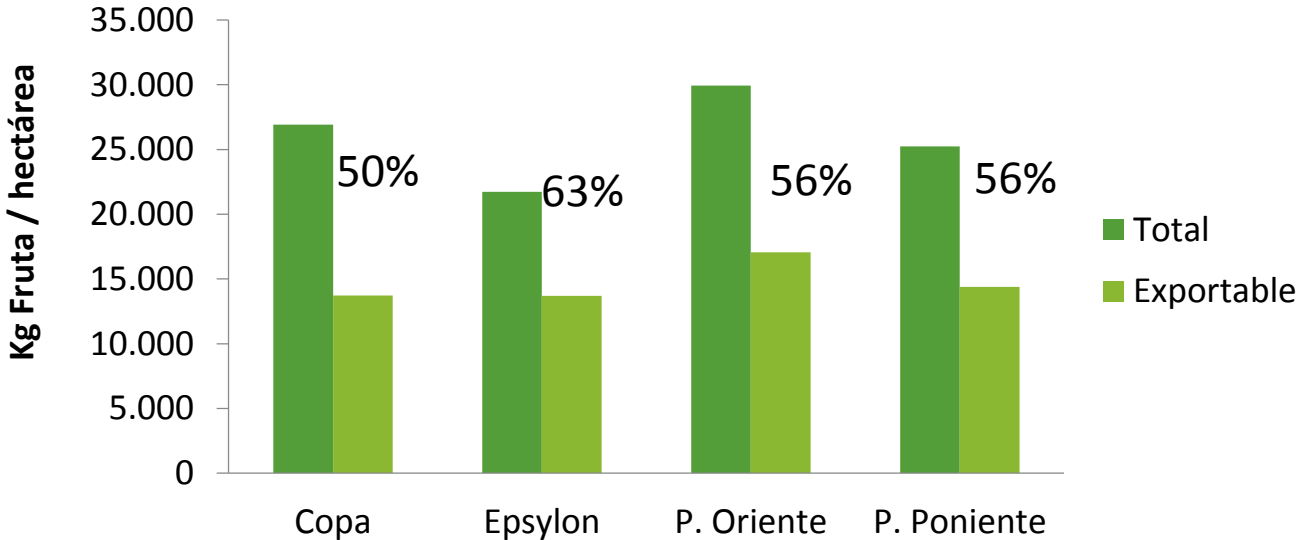
# Clemenules Segunda Temporada



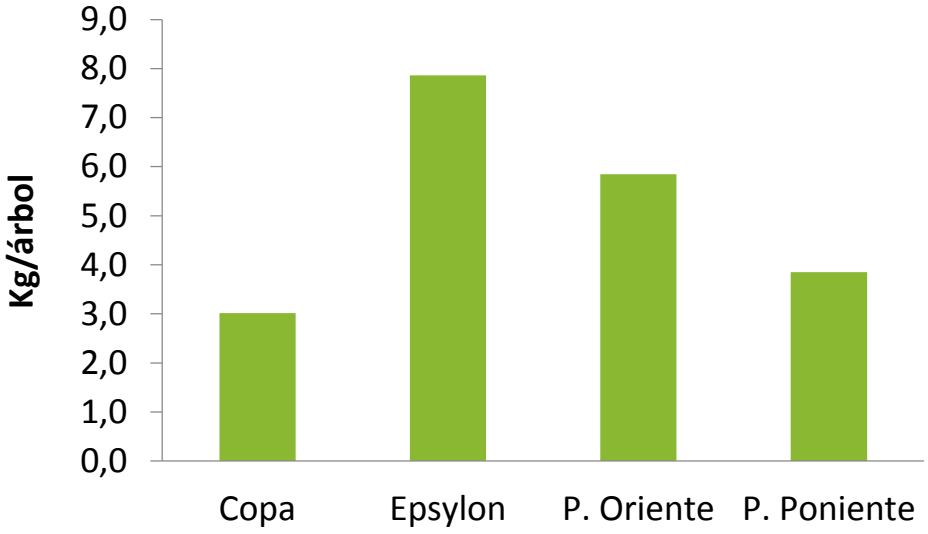



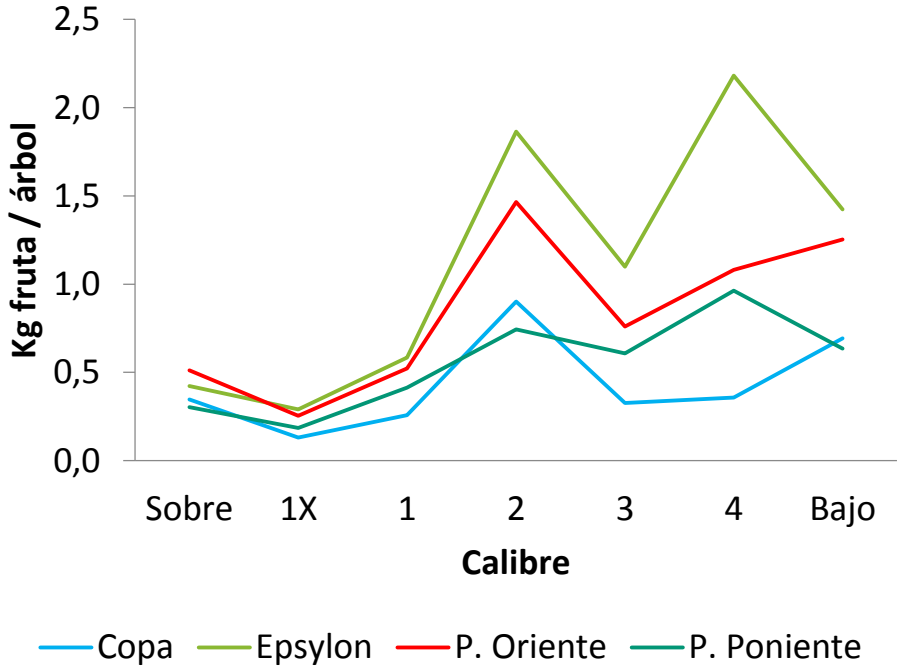
# W. Murcott Primera Temporada



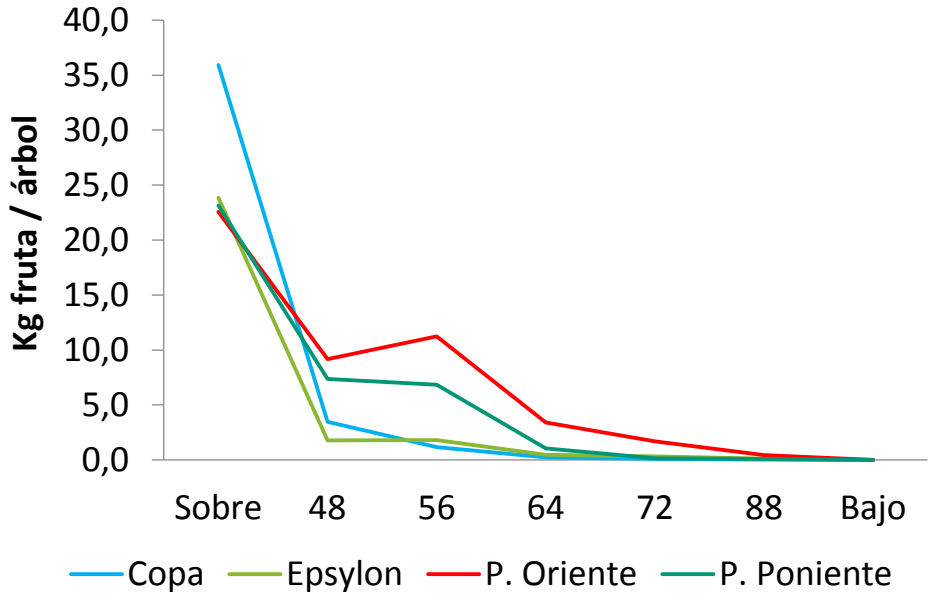



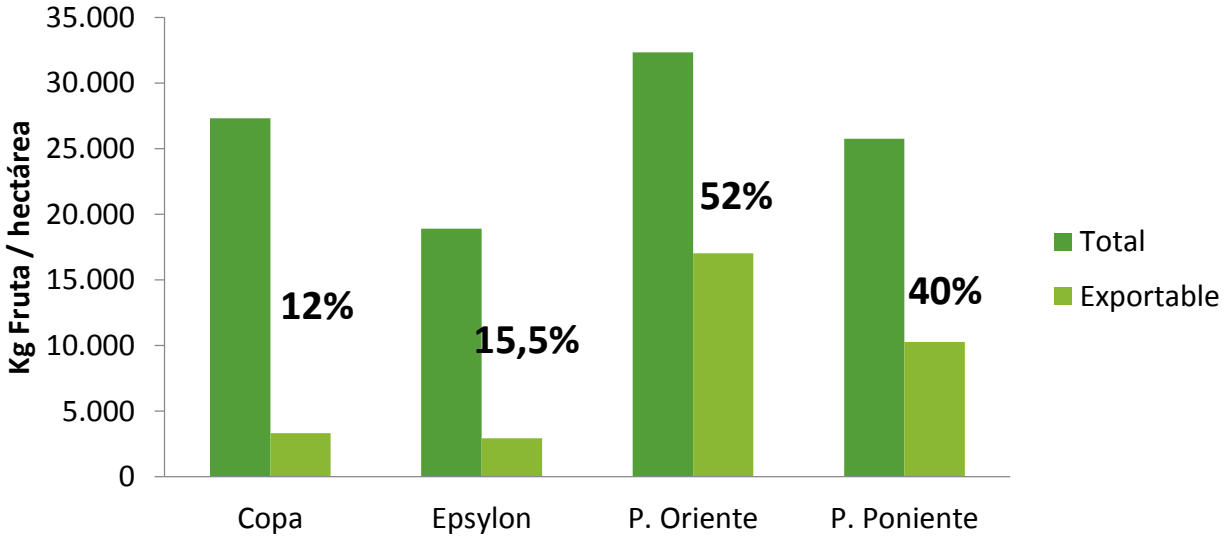
# W. Murcott Segunda Temporada



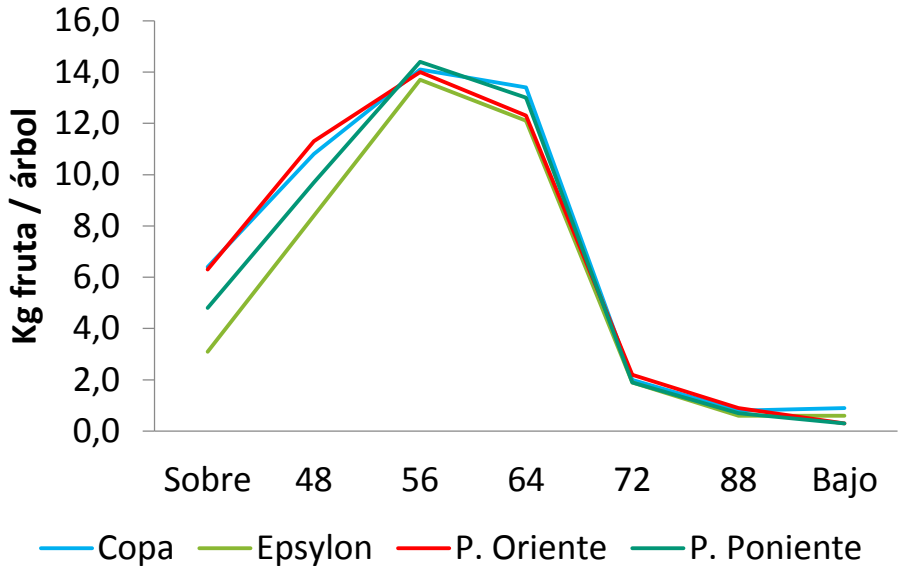



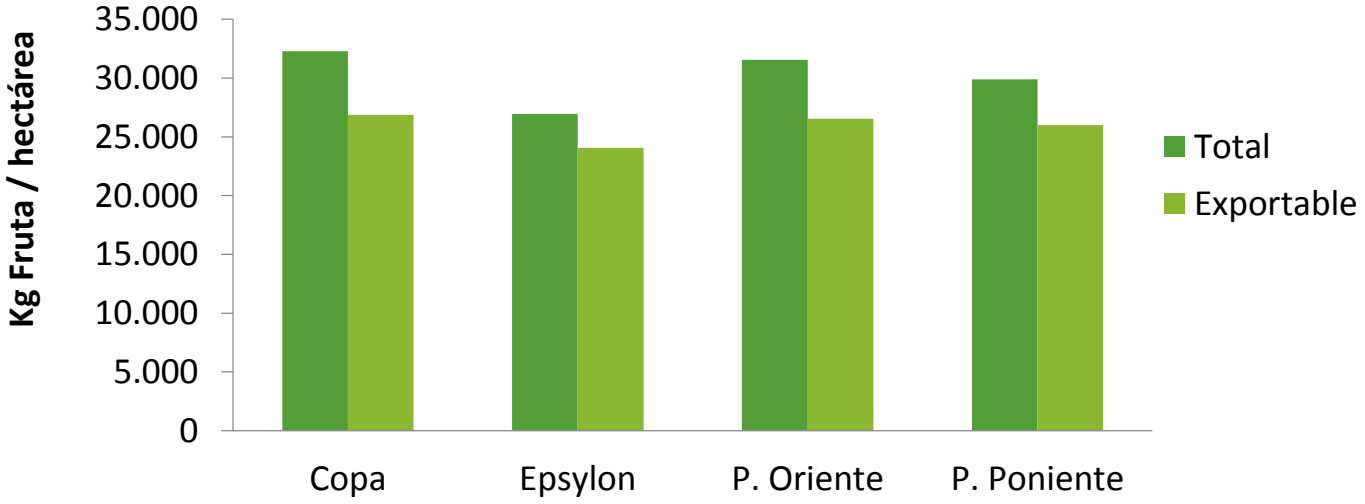
# P. Washington Primera temporada



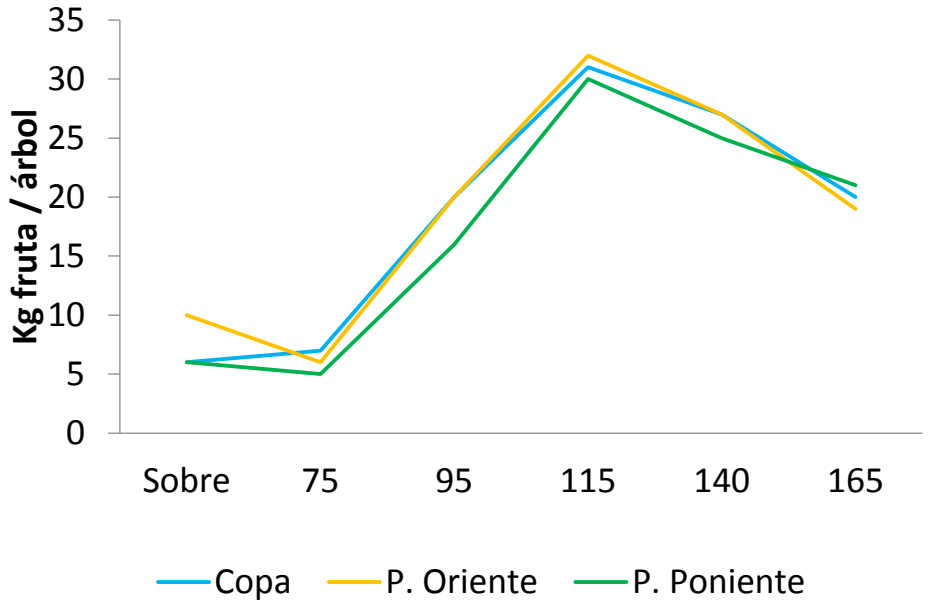



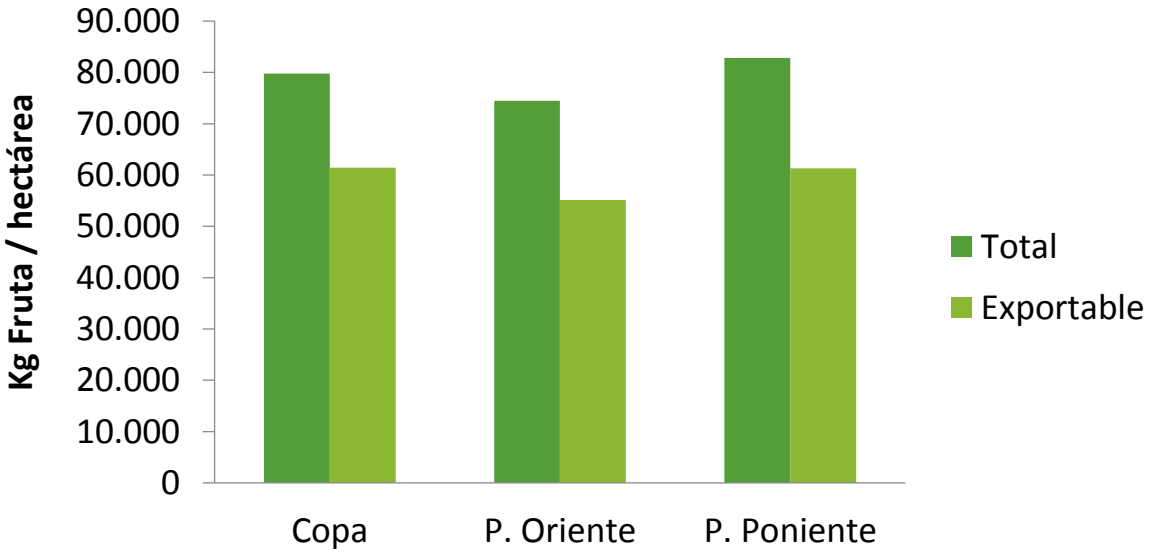
# P. Washington Segunda temporada



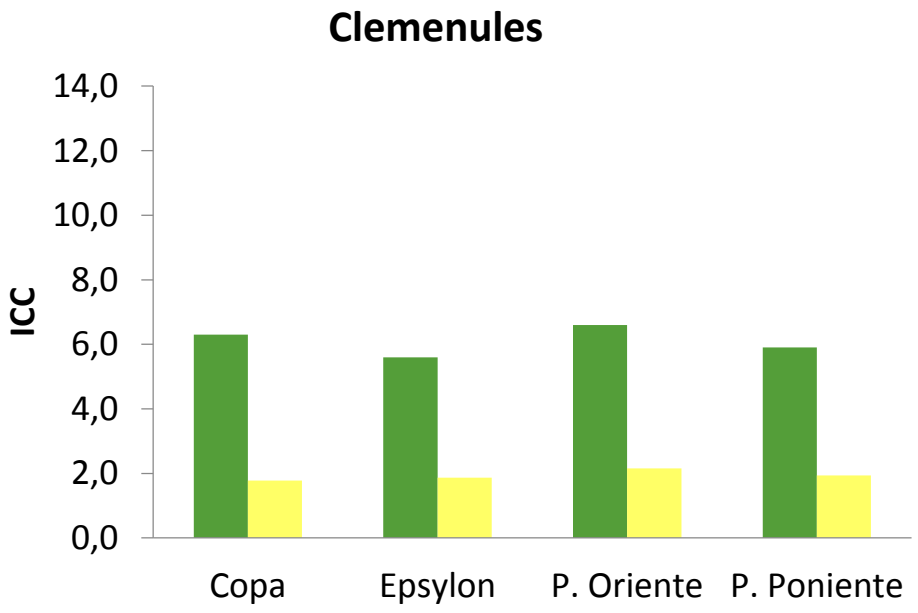
# Eureka

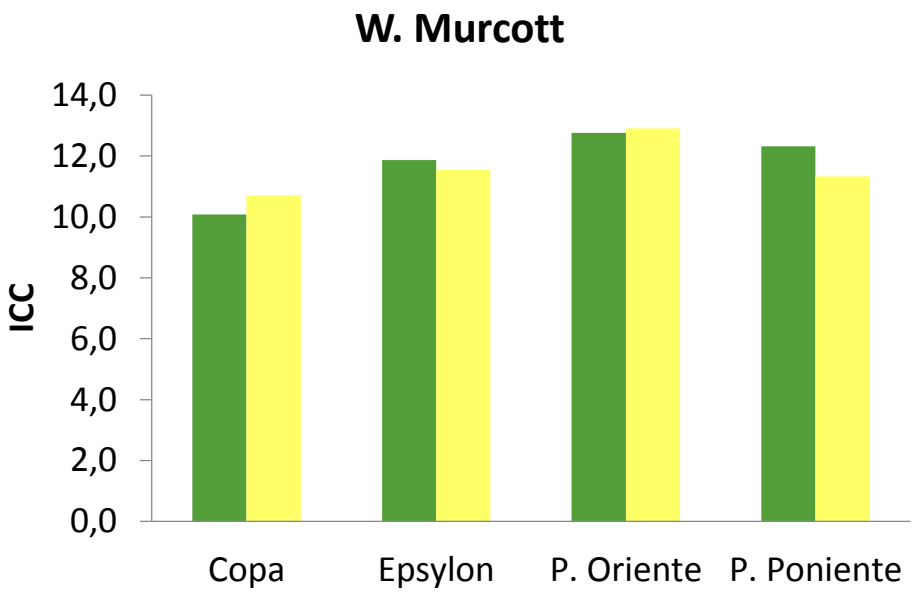

Kg fruta / árbol
35
30
25
20
15
10
5
0
Sobre
75
95
115
140
165
Copa
P. Oriente
P. Poniente


Kg Fruta / hectárea
90.000
80.000
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0
Copa
P. Oriente
P. Poniente
Total
Exportable

# CALIDAD

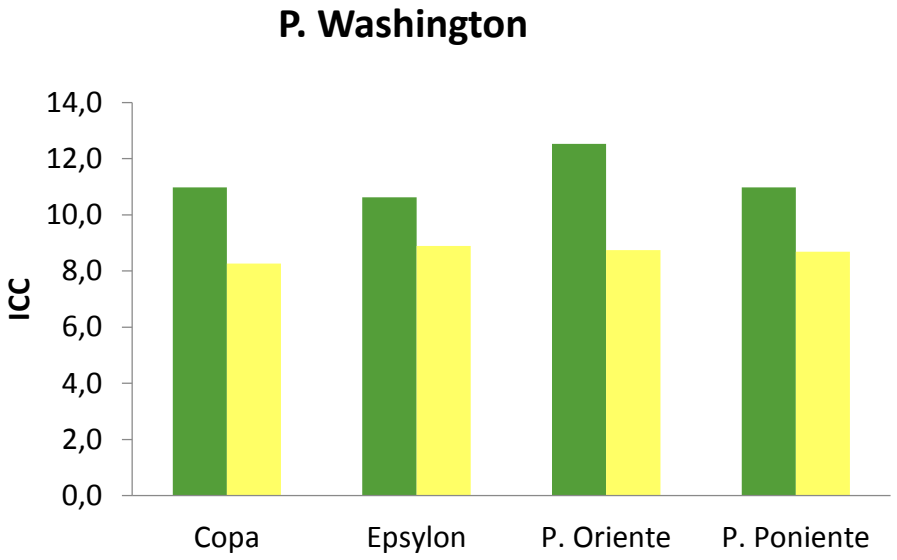
# Color (ICC)

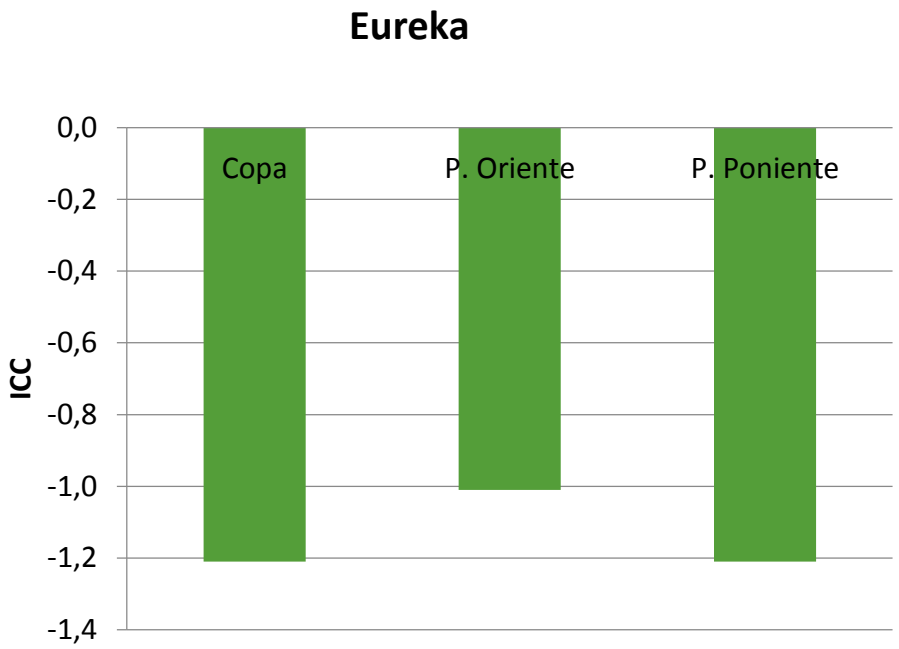



1° Temporada  2° Temporada

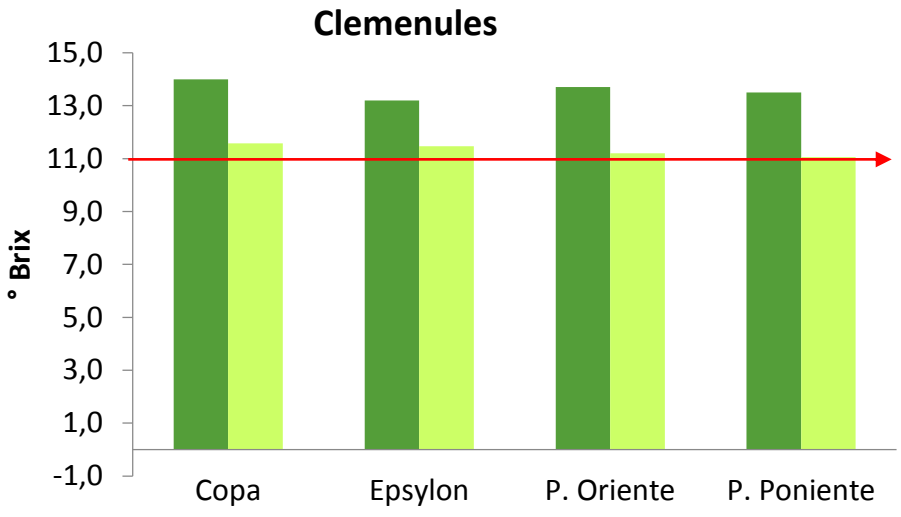
# Color (ICC)

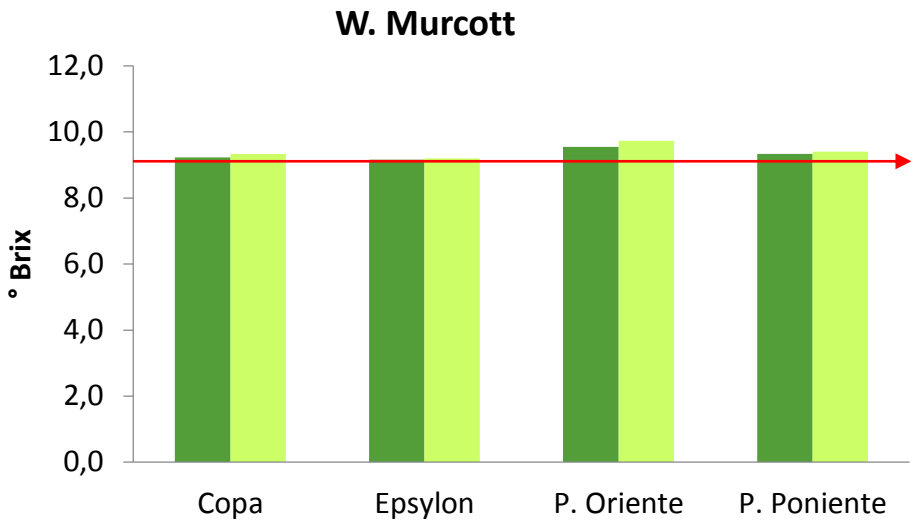


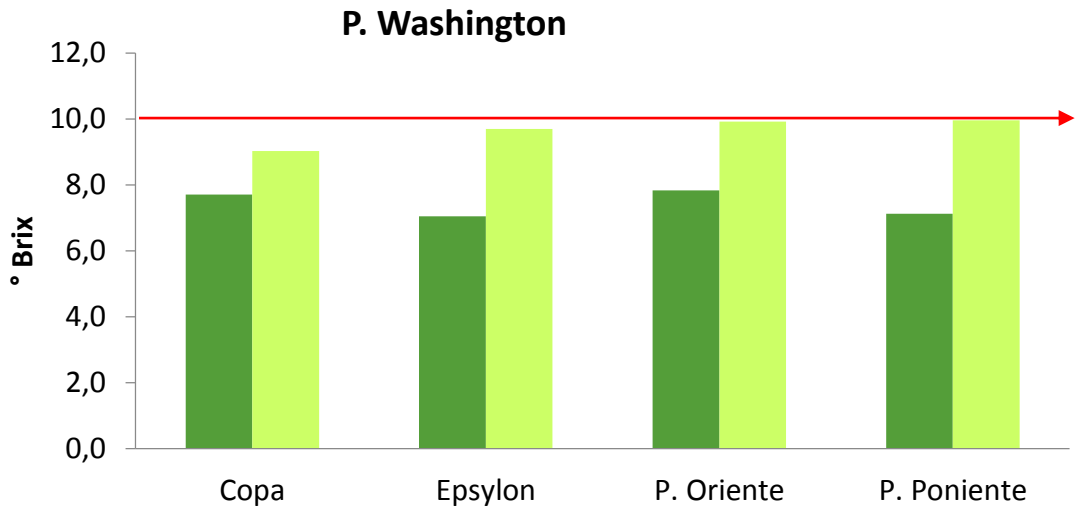




1° Temporada  2° Temporada

# Contenido de Sólidos Solubles

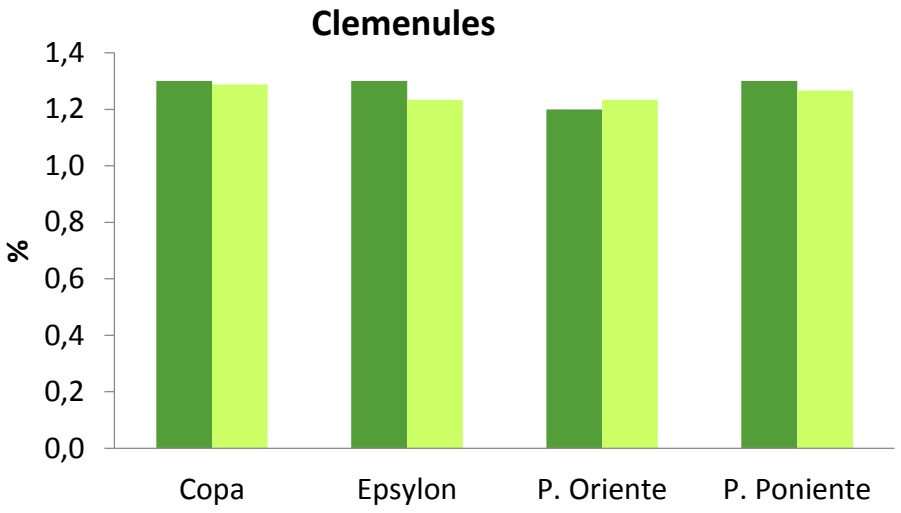


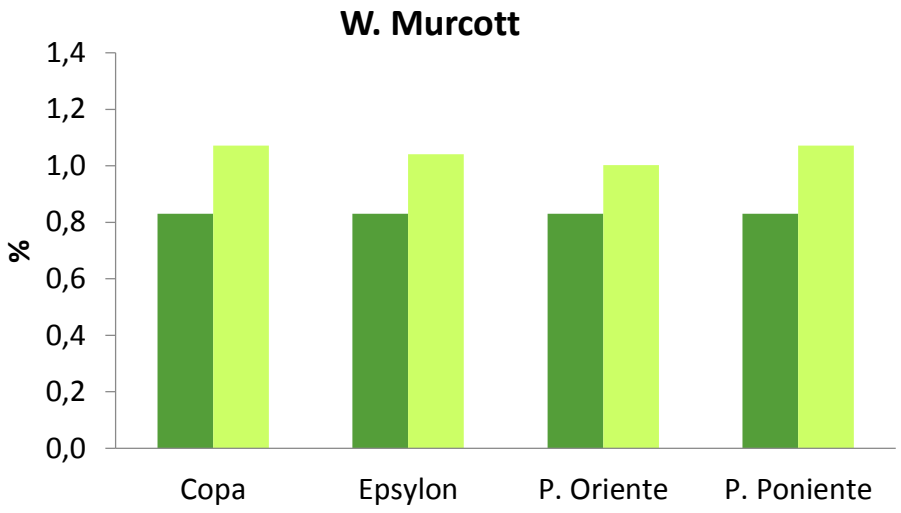



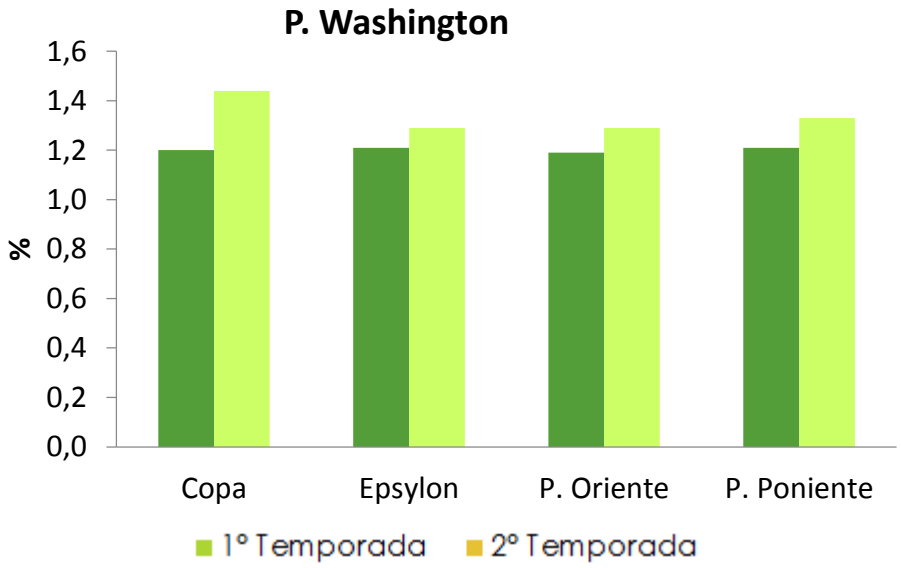




1° Temporada 2° Temporada

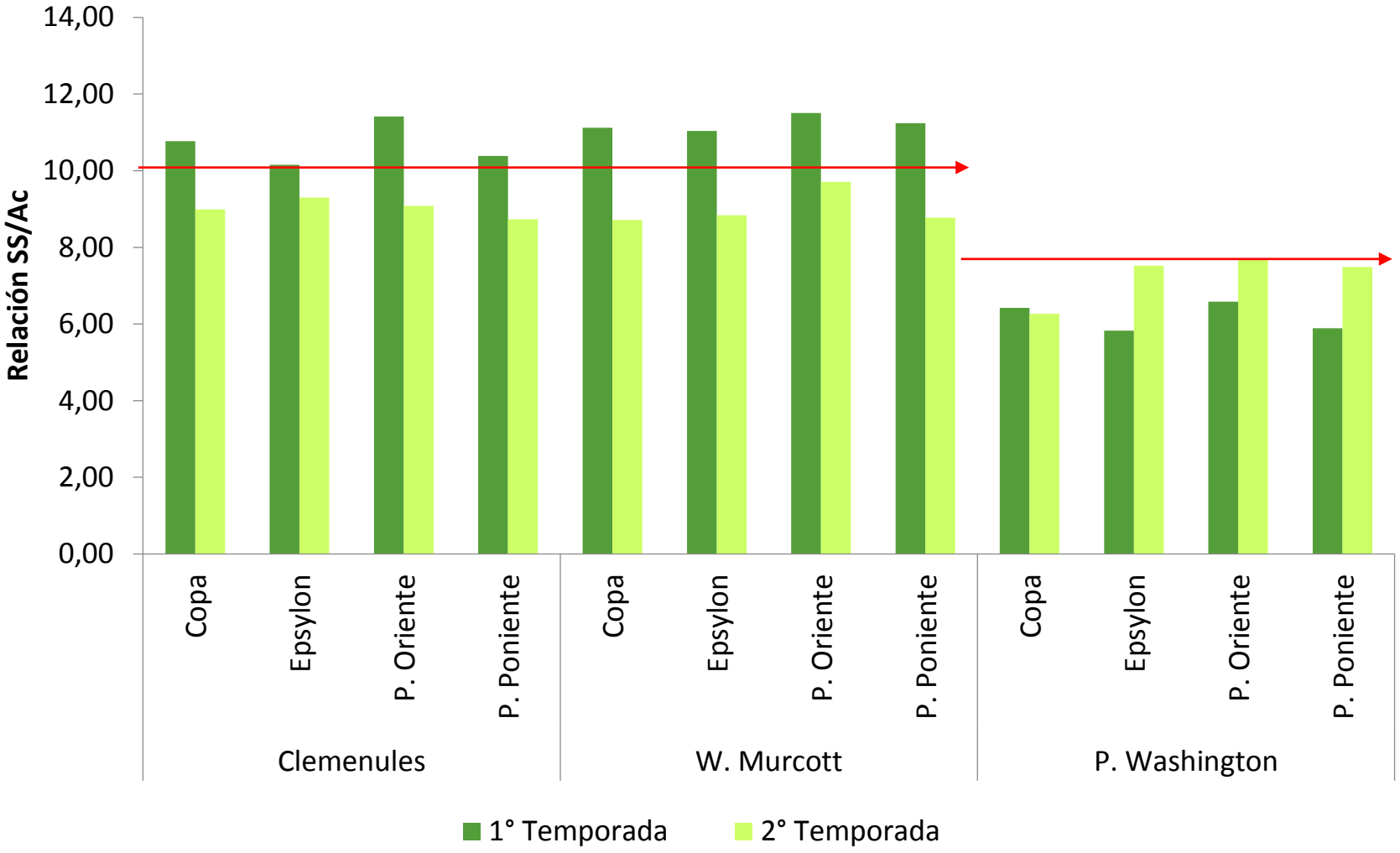
# Porcentaje de Acidez



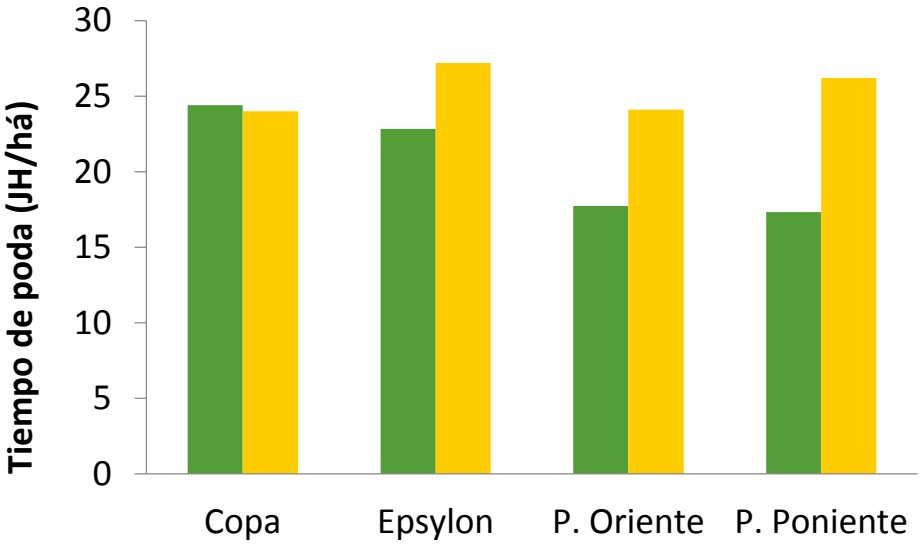



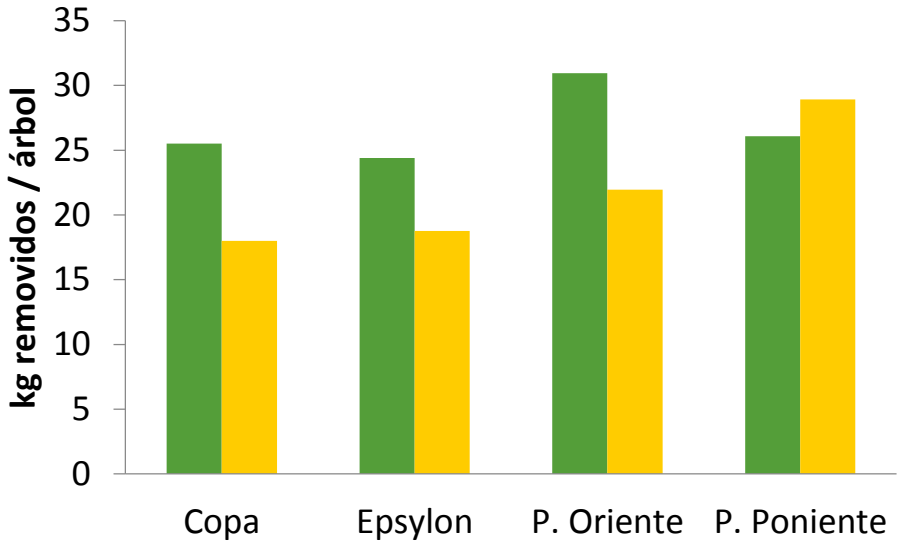
# Relación Sólidos Solubles / Acidez



# USO MANO DE OBRA

# Tiempo y Peso de Poda - Clemenules

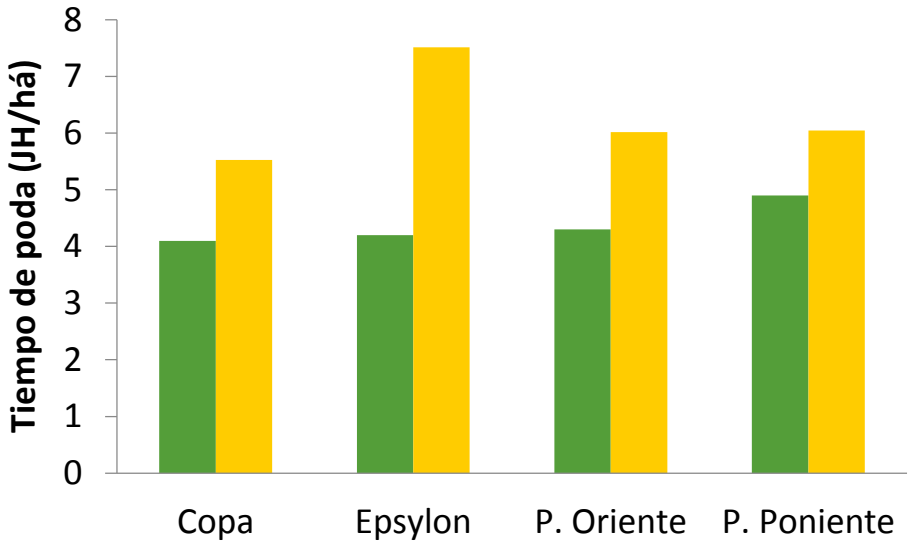


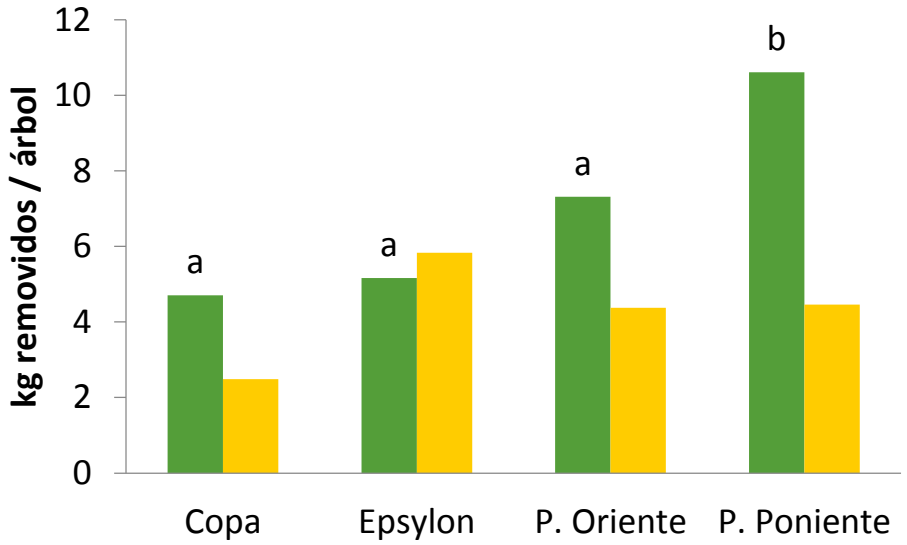




1º Temporada

2º Temporada

# Tiempo y Peso de Poda – W. Murcott

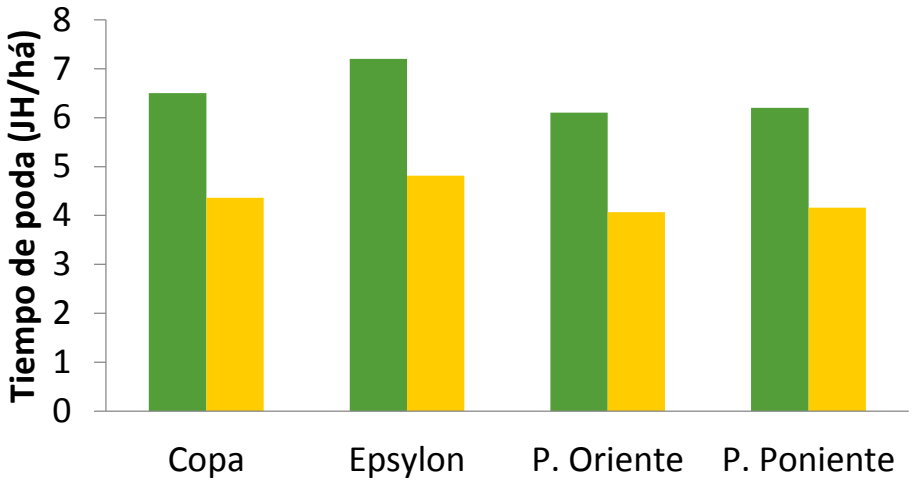


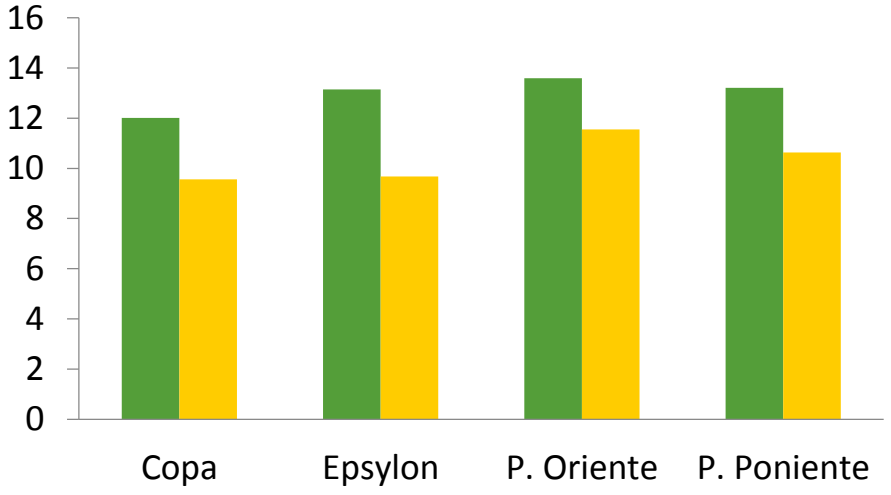




1° Temporada

2° Temporada

# Tiempo y Peso de Poda – P. Washington

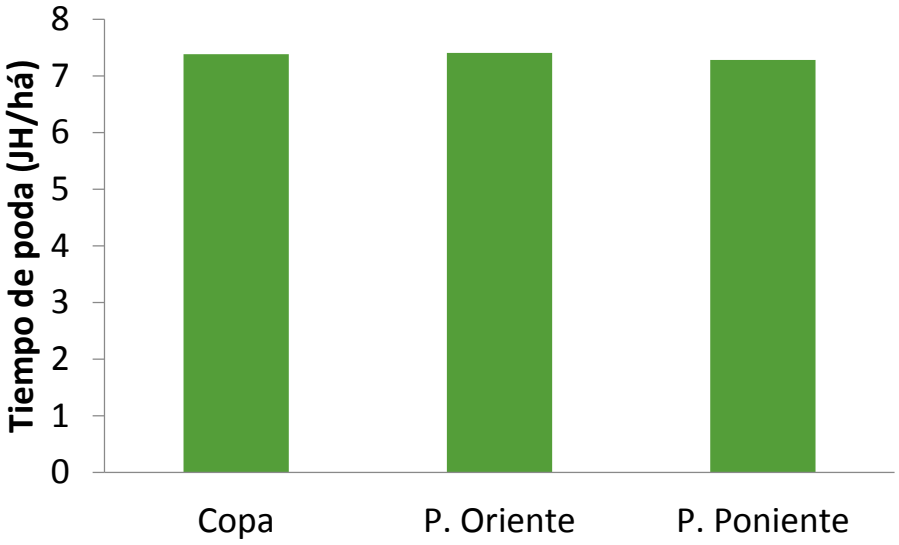


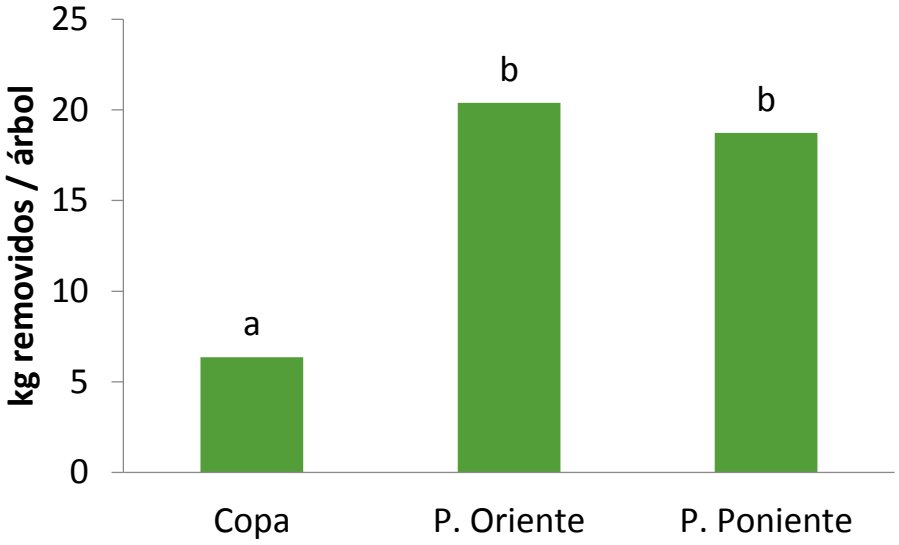



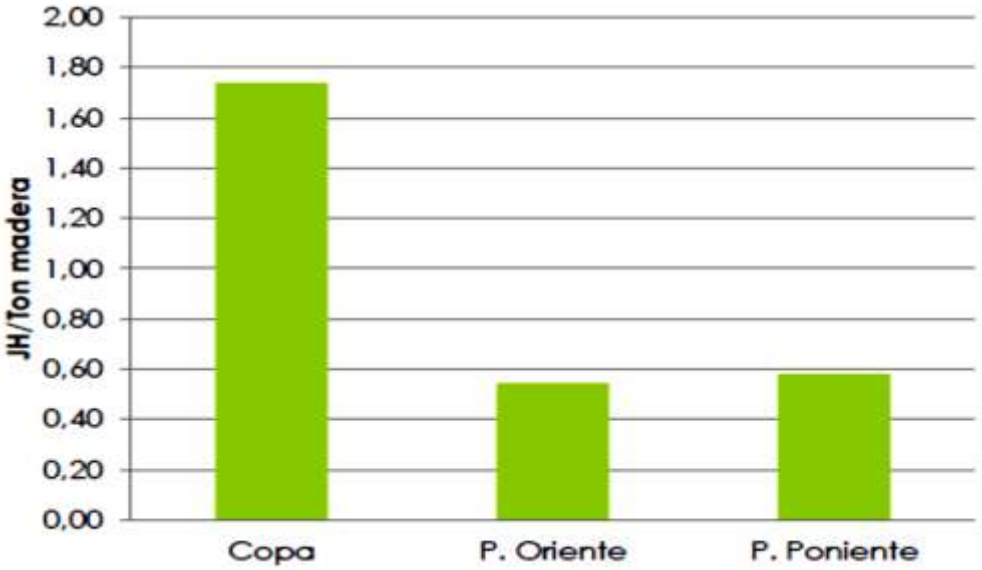

1° Temporada

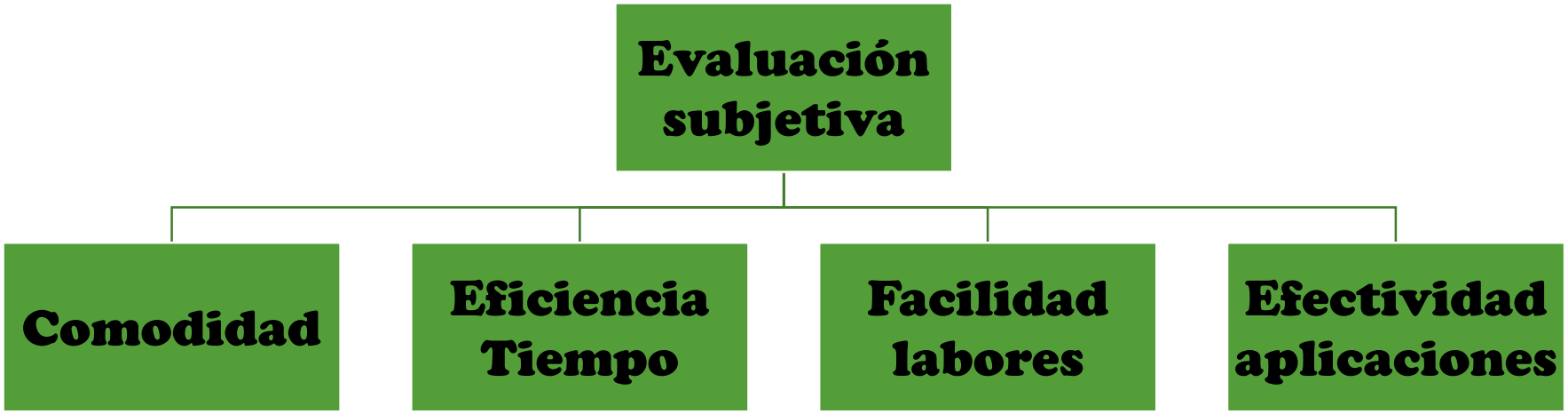
2° Temporada

# Tiempo y Peso de Poda - Eureka

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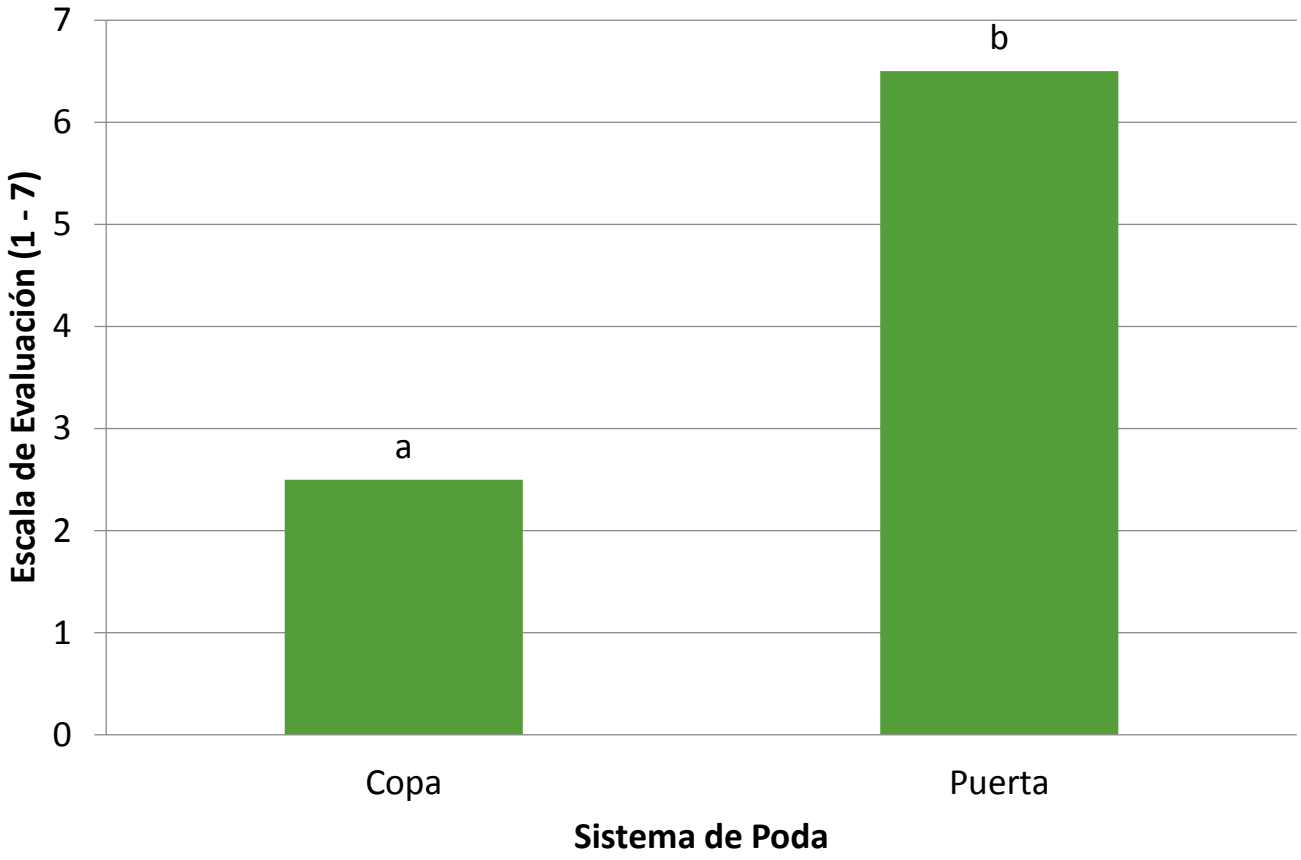
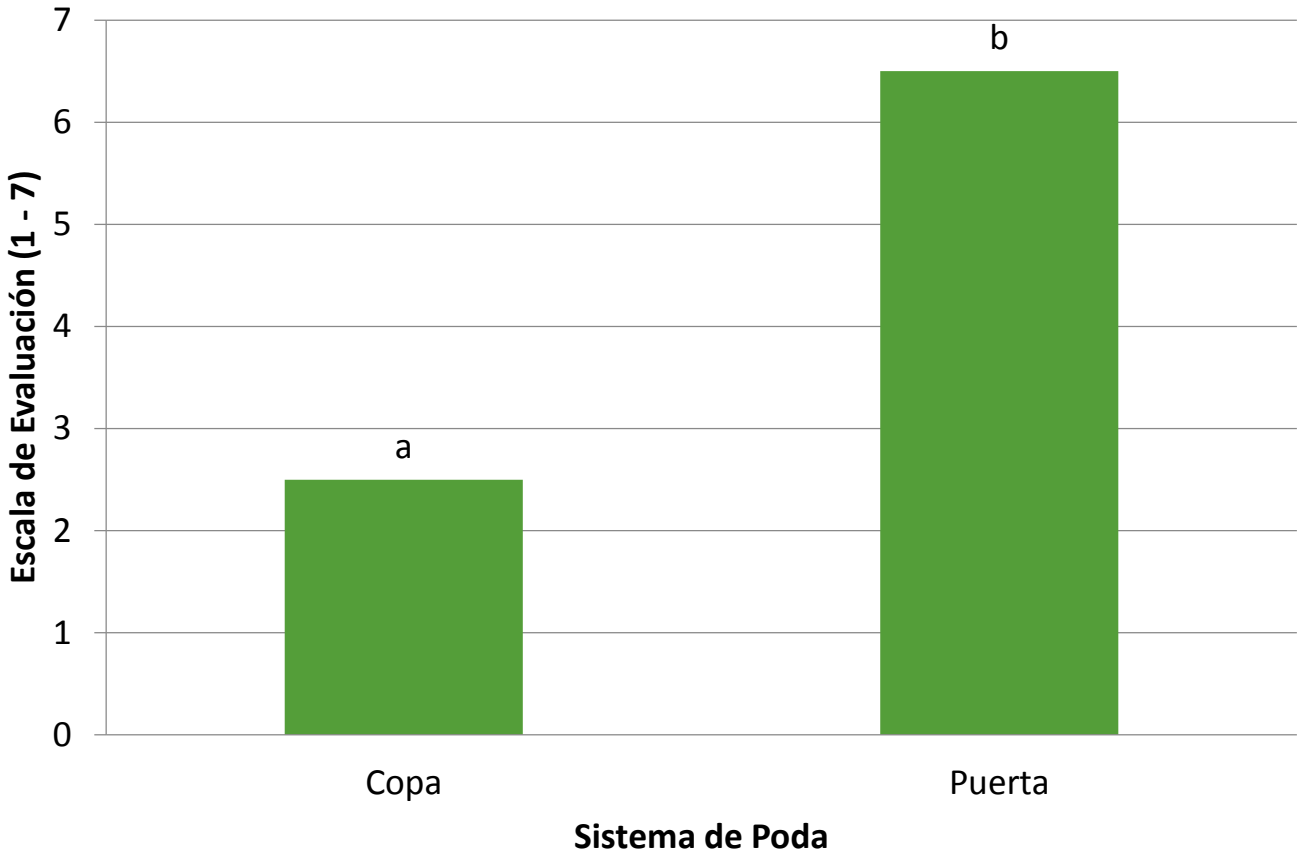
Comodidad
Eficiencia Tiempo
Facilidad labores
Efectividad aplicaciones

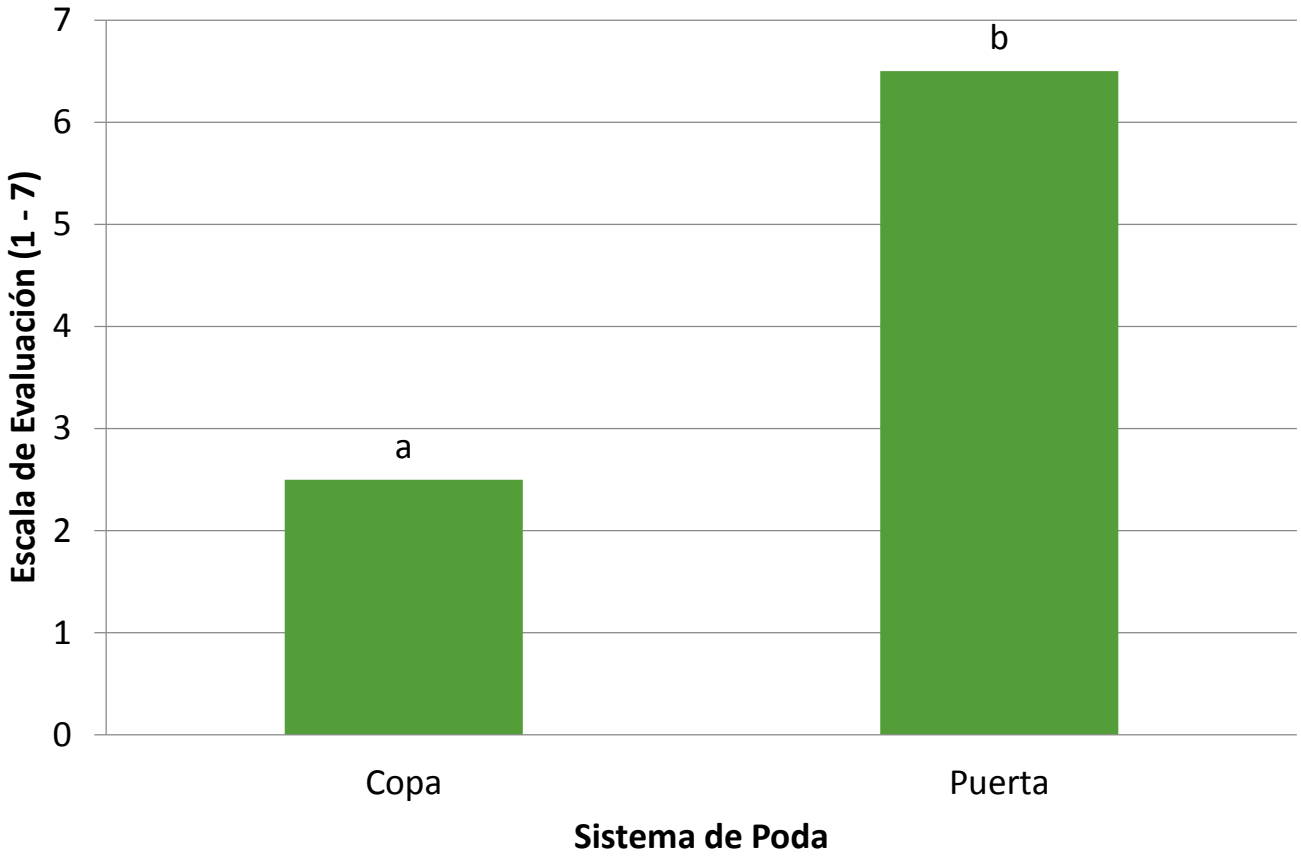
# Comodidad


7
6
5
4
3
2
1
0
Escala de Evaluación (1 - 7)
a
b
Copa
Puerta
Sistema de Poda

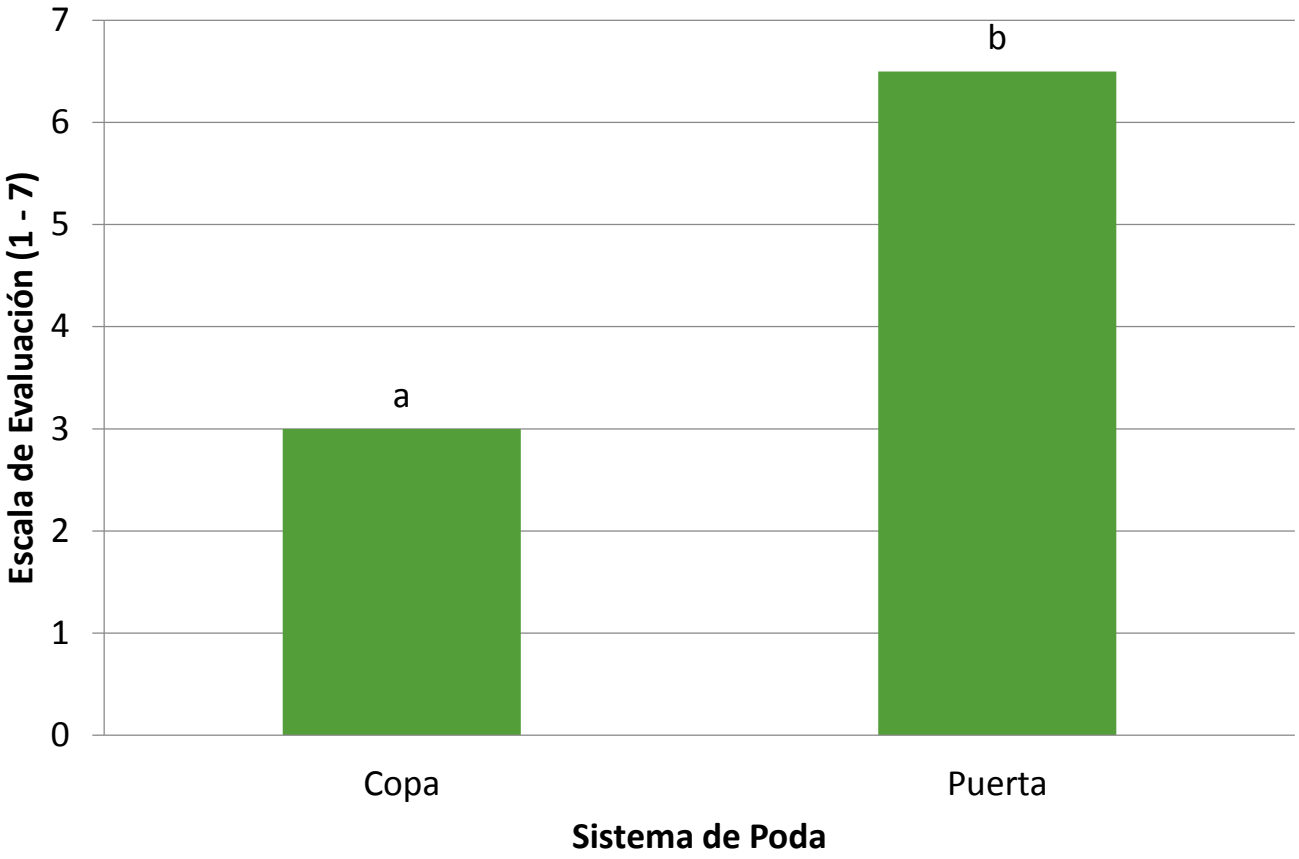
# Eficiencia en Tiempo



# Facilidad de Labores



# Efectividad en Aplicaciones



## *CONCLUSIÓN*

**EL PROBLEMA NO ES LA CANTIDAD DE LUZ SINO LA DISTRIBUCIÓN EN EL ARBOL**

EL SISTEMA DE PODA EN PUERTA ORIENTE PRESENTÓ EL MEJOR COPORTAMIENTO EN LA MAYORÍA DE LOS PARÁMETROS EVALUADOS

LA LUZ ESTÁ EN ESTRECHA RELACIÓN A LA TEMPERATURA