
SUN DRYING IN CHILE
A SUCCESSFUL EXPERIENCE
CHILE PRUNES A.G.
IPA CONGRESS 2015
SIRMIONE, ITALY


TOPICS
I) WHY DOES CHILE SUN DRY?
II) STAGES IN SUN DRYING
III) TYPES OF SUN DRYING IN CHILE


Chile has natural barriers, which protect the prune production from foreign pests and diseases
Chile is a
phytosanitary island

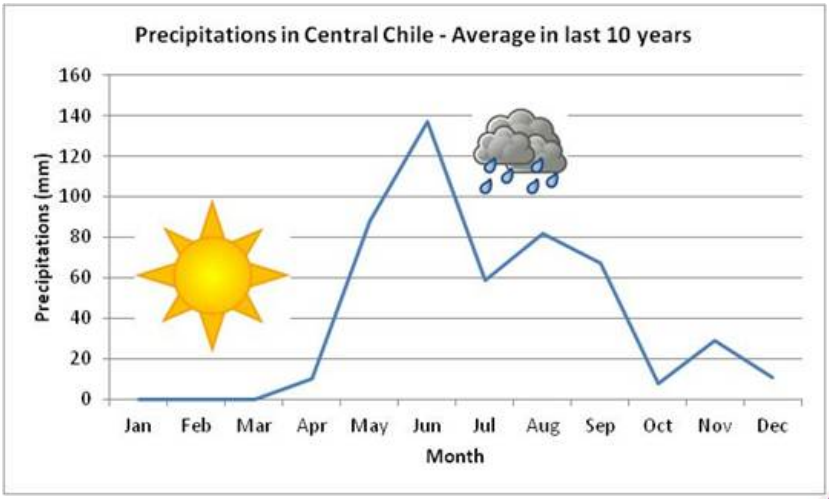

I) WHY DOES CHILE SUN DRY?

I) Why does Chile sun dry?

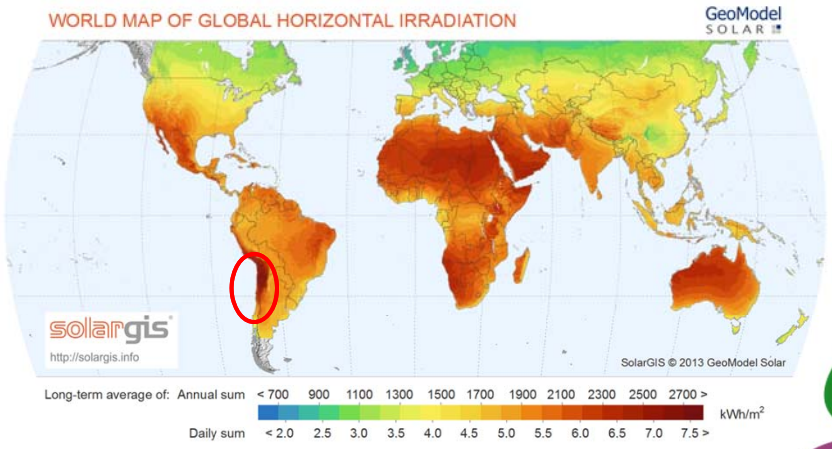
Climatic conditions allow sun drying (no rain during drying process and high radiation)

Climatic conditions that allow sun drying in Chile

Mediterranean weather



Climatic conditions that allow sun drying in Chile
High radiation



I) Why does Chile sun dry?

Sun drying Good Practices→ Excellent Quality

Sun drying Good Practices→ Excellent Quality

Sun drying Good Practices□ Excellent Quality

1.- Harvest index

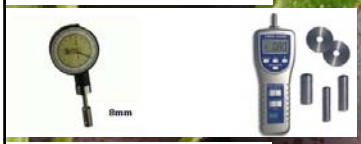
Firmness flesh	°Brix	Relation F/D	Falls %	Yield	Size
8	20	3,5	3	8.696	76
6	22	3,2	7	9.375	70
4	24	3,0	15	10.000	65
2	26	2,8	25	10.000	60
1,5	27	2,6	35	10.000	55
1,5	28	2,4	45	10.000	51

Source: based on figures of UC Davis y CK2.

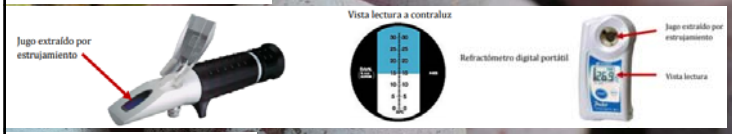
Sun drying Good Practices□ Excellent Quality

1.- Harvest index

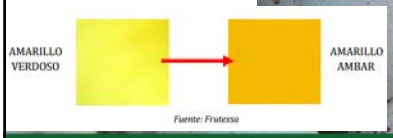
Firmness



Brix°



Color



Sun drying Good Practices□ Excellent Quality

2.- Harvest

Harvest machineries and materials

Sun drying Good Practices□ Excellent Quality

3.- Food Safety

- Chilean sanitary legislation

Chilean Legislation DTO. N° 977/96 Dried fruits			
E. Coli NMP / g	Salmonella in 25 g	Mold c.f.u./ g	Yeasts c.f.u./ g
m = 50	m = 0	$m = 10^2$	$m = 10^2$
$M = 5 \times 10^2$	M = ---	$M = 10^3$	$M = 10^3$

- Differences among drying processes

	E. Coli NMP / g	Salmonella in 25 g	Mold c.f.u./ g	Yeasts c.f.u./ g
Sun dried plums #1	< 3	absence	< 10	< 10
Sun dried plums #2	< 3	absence	< 10	< 10
Tunnel dried plums #1	< 3	absence	< 10	< 10
Tunnel dried plums #2	< 3	absence	< 10	< 10

Sun drying Good Practices□ Excellent Quality

3.- Food Safety

- Phytosanitary Program for prunes
- MRL lab analysis
- MRL tolerances by destination market

Chile prunes association

PROGRAMA FITOSANITARIO

CIRUELO EUROPEO
Comité Técnico CHILEPRUNES

Este programa fitosanitario fue desarrollado por el comité técnico de la APECS (Asociación de Procesadores y Exportadores de Ciruelas Secas de Chile) y es resultado del estudio de las regulaciones de productos fitosanitarios en los mercados a los cuales nuestra ciruela es destinada. Este programa cumple con los requisitos de los mercados externos en cuanto a residuos de pesticidas, no obstante no exime de responsabilidad al productor en la correcta aplicación de los productos, de acuerdo a sus registros, forma de aplicación, de todo lo que se refiere a la mantención y calibración de la maquinaria agrícola y **de cumplir con los Límites Máximos de residuos (LMR) de los paises de destino de los productos.**

Este programa es solo una recomendacion y exime a APECS de toda responsabilidad de uso e implementacion. En www.sag.cl, link SAG productos autorizados usted encontrara el listado de productos autorizados y restringidos para la aplicacion en ciruelos.

I) Why does Chile sun dry?

Eco-Friendly

Eco-Friendly

Less C02 emissions in drying process

✓ More informed consumers

✓Studies undertaken in Chile:

- Sun drying: 0,044 kg/CO2 for 1 kg of dried plum. *Source: Fundación Chile.*
- *Tunnel drying: 1,5 kg/CO2* for 1 kg of dried plum.

Source: Universidad USACH.

Sun drying → Equivalent to 3% of the emissions of tunnel drying.

II) Stages in sun drying

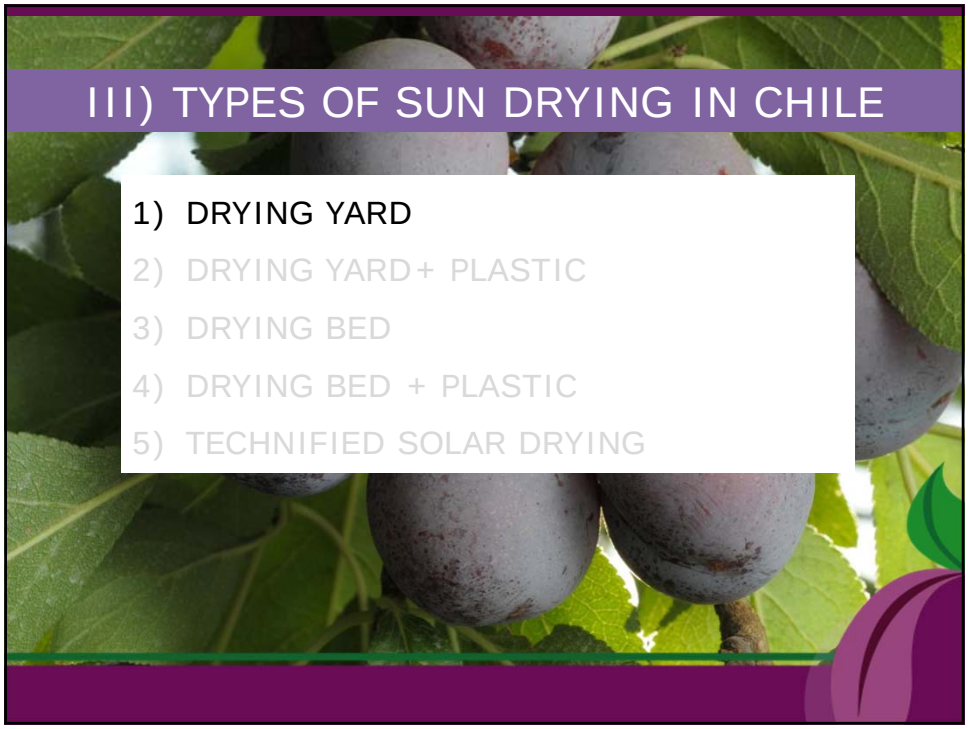
II) Stages in sun drying

Harvest

II) Stages in sun drying

Transportation to drying facilities


III) TYPES OF SUN DRYING IN CHILE


III) TYPES OF SUN DRYING IN CHILE
1) DRYING YARD
2) DRYING YARD+ PLASTIC
3) DRYING BED
4) DRYING BED + PLASTIC
5) TECHNIFIED SOLAR DRYING

1) DRYING YARD

Unload to cart

1) DRYING YARD

Unload to drying facilities

1) DRYING YARD

PROCESS

- ✓ Net installation
- ✓ Unload on the nets
- ✓ Homegenic distribution of the fruit
- ✓ Moving the fruit periodically

CHARACTERISTICS

- ✓ Average T° 30 - 35°C
- ✓ Tº increases when direct exposure
- ✓ Moisture 18 to 20%
- ✓ Moisture tester

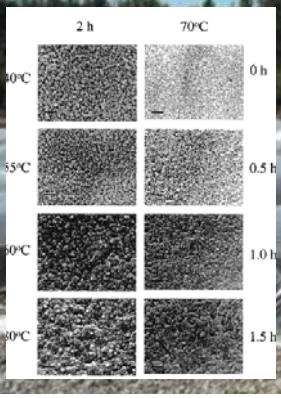
Drying time: 15 days

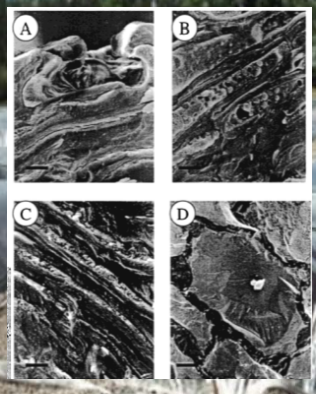
III) TYPES OF SUN DRYING IN CHILE

1) DRYING YARD
2) DRYING YARD + PLASTIC
3) DRYING BED
4) DRYING BED + PLASTIC
5) TECHNIFIED SOLAR DRYING

2) DRYING YARD+ PLASTIC

Role of the waxy skin layer (pruine)





Source: Role of the Waxy Skin Layer in Moisture Loss during Dehydration of Prunes. 2000.

2) DRYING YARD+ PLASTIC

PROCESS

- ✓ Net installation
- ✓ Unload on the nets
- ✓ Homegenic distribution of the fruit
- ✓ Moving the fruit periodically
- ✓ Plastic installation

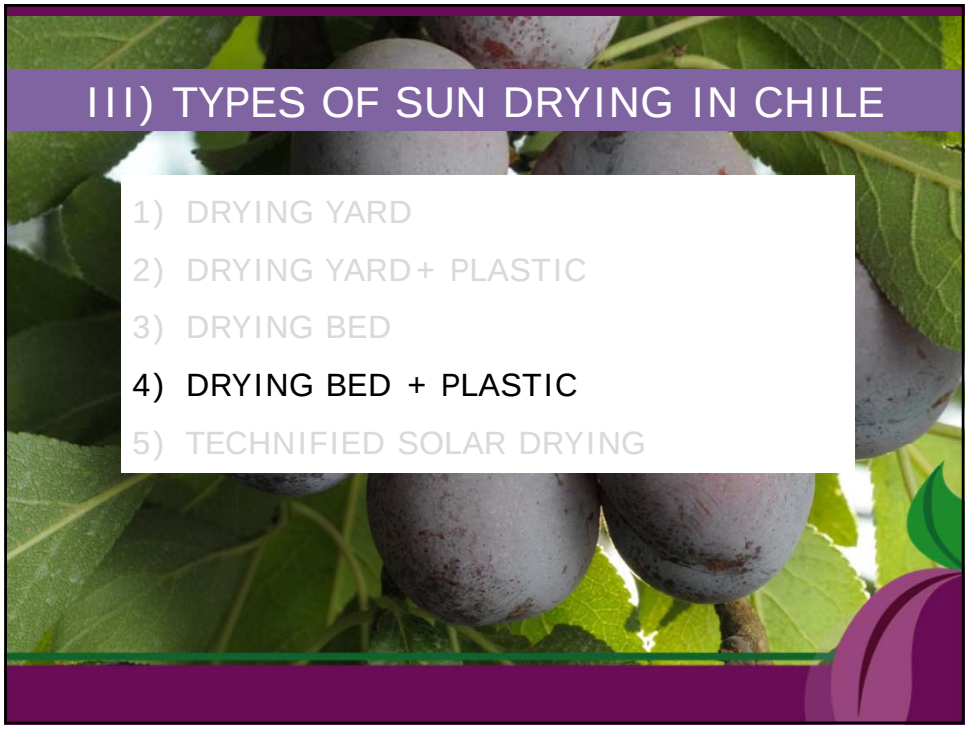
CHARACTERISTICS

- ✓ Radiation increases temperature
- ✓Average T° 60 - 70°C
- ✓ Reaches high humidity. Needs ventilation

Drying time: 7 days

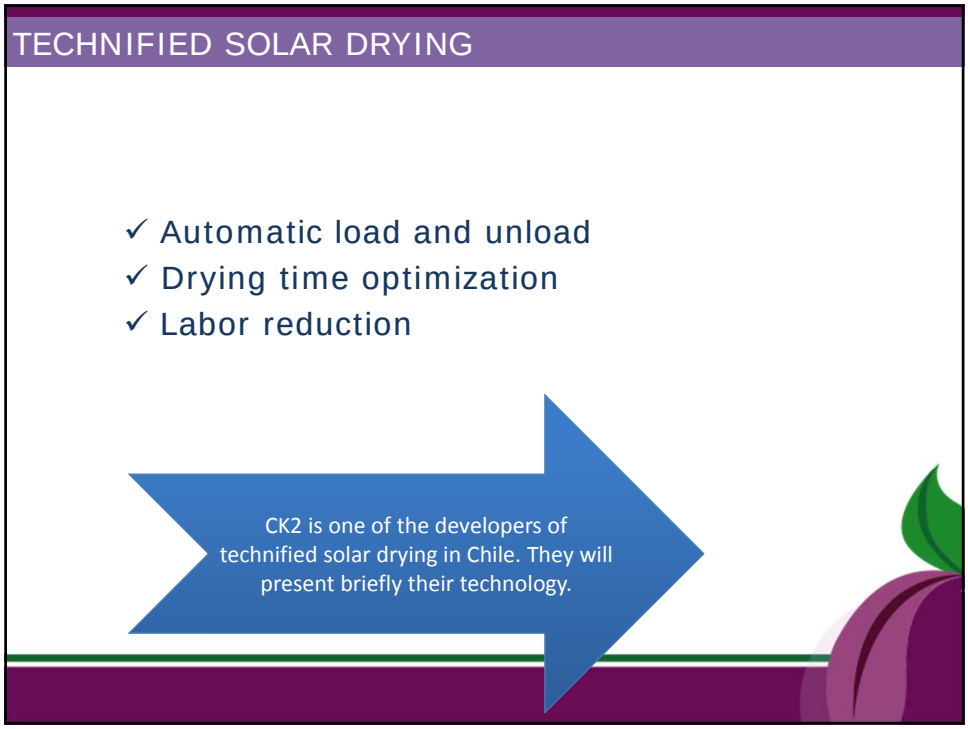

III) TYPES OF SUN DRYING IN CHILE
1) DRYING YARD
2) DRYING YARD+ PLASTIC
3) DRYING BED
4) DRYING BED + PLASTIC
5) TECHNIFIED SOLAR DRYING

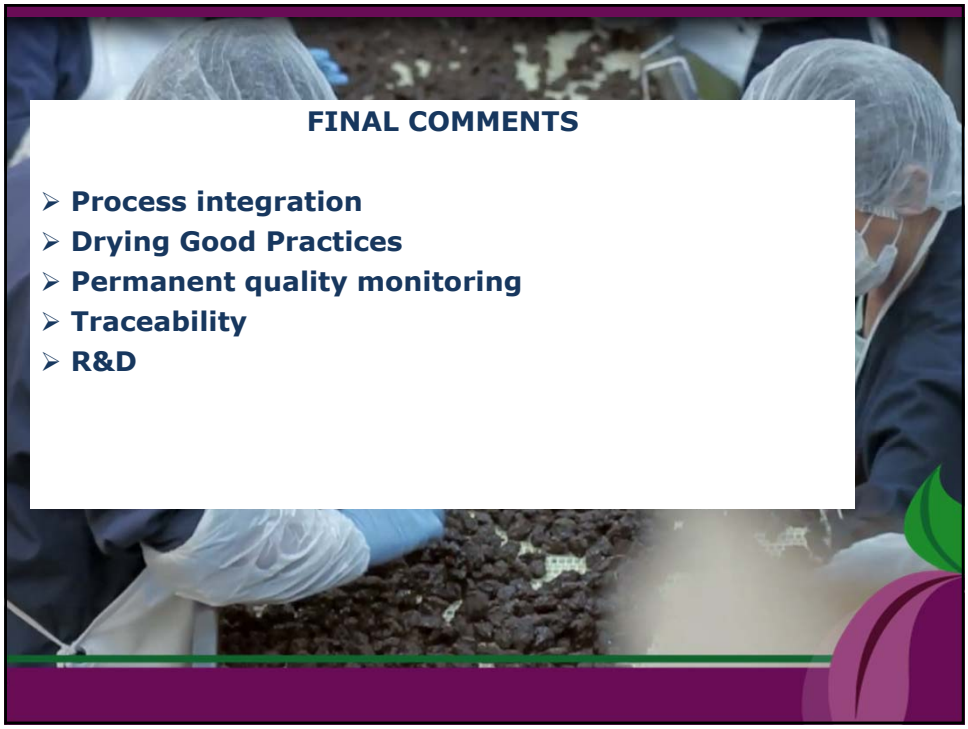

3) DRYING BEDS
PROCESS
✓ Building the drying beds
CHARACTERISTICS
✓ Improves ventilation
✓ Decreases drying time
Drying time: 10 days


III) TYPES OF SUN DRYING IN CHILE
1) DRYING YARD
2) DRYING YARD+ PLASTIC
3) DRYING BED
4) DRYING BED + PLASTIC
5) TECHNIFIED SOLAR DRYING


4) DRYING BEDS+ PLASTIC
PROCESS
✓Building drying beds
✓Plastic installation
CHARACTERISTICS
✓ Improves ventilation
✓ Increases temperature
✓ Decreases drying time
Drying time: 5 days


III) TYPES OF SUN DRYING IN CHILE
1) DRYING YARD
2) DRYING YARD+ PLASTIC
3) CAMASTROS
4) CAMASTROS + PLASTIC
5) TECHNIFIED SOLAR DRYING


TECHNIFIED SOLAR DRYING
✓ Automatic load and unload
✓ Drying time optimization
✓ Labor reduction
CK2 is one of the developers of technified solar drying in Chile. They will present briefly their technology.


FINAL COMMENTS
Process integration
Drying Good Practices
Permanent quality monitoring
Traceability
R&D


THANKS
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