TICA
Thailand International Cooperation Agency

80th Anniversary
SILPAKORN UNIVERSITY

Annual International Training Course (AITC) 2023

The application of a parabolic greenhouse solar dryer together with raw material preparation techniques to extend shelf-life and enhance quality of agricultural products

24 April – 5 May 2023

Lecture 7_27 April 2023

Production of osmotic dehydration fruits using a solar dryer and a tray dryer

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Production of dried tomato

Osmotic dehydration

General Process of osmotic dehydrated Products

Raw materials: Fruits

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Raw materials preparations: Selection, Cleaning, Washing, Sanitization, Peeling, Trimming, Slicing,

Pretreatment: dipping in pretreatment solution such as calcium chloride, acid and or sulfiting agents, blanching and sugaring by dipping fruit slices into osmotic solution

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Drying or Dehydration: Greenhouse Solar dryer or tray dryer

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Osmotic dehydrated Products

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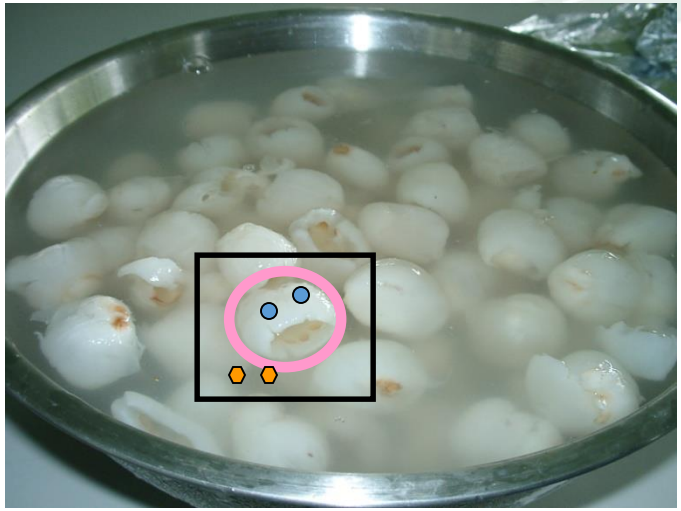
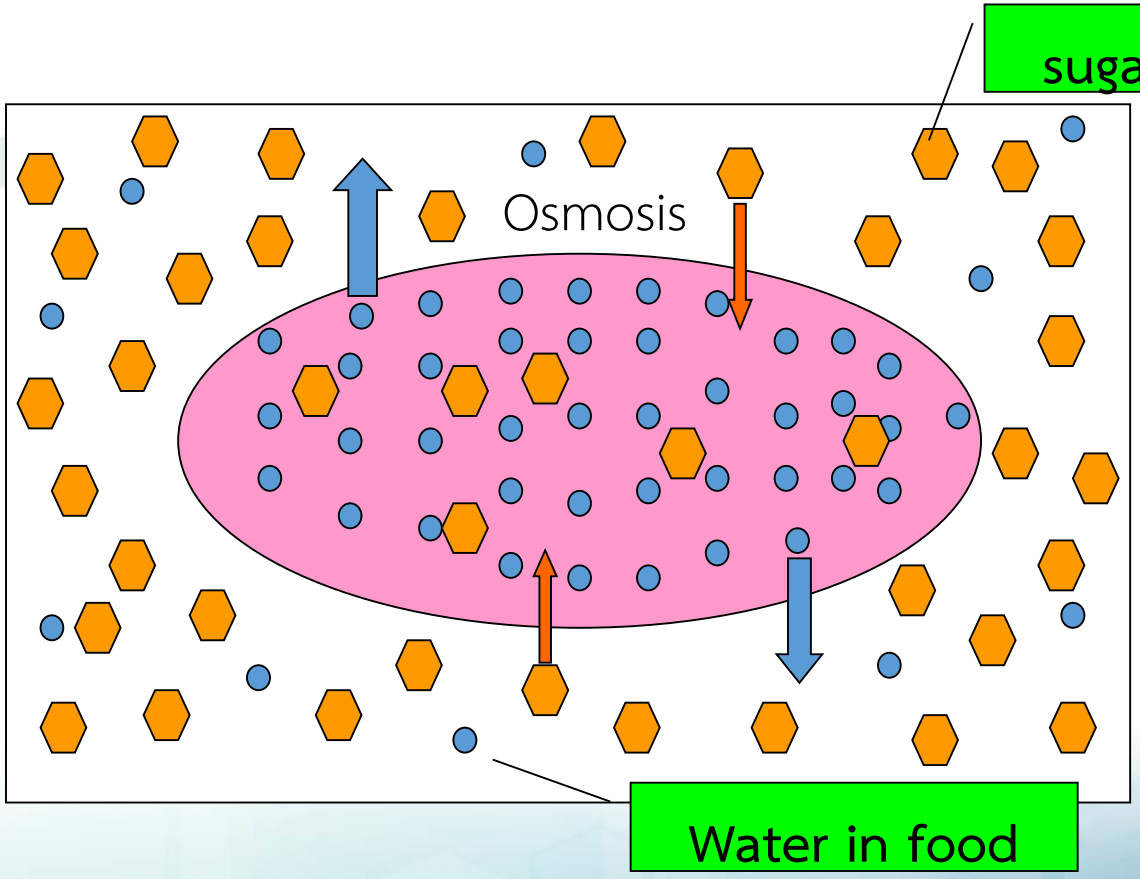
Packaging and Storage

Osmotic dehydration



lychee in sugar solution



Osmotic dehydrated fruits

Osmotic dehydrated fruits

Osmotic dehydrated fruits

▲ *Soft Dried*

Osmotic Dehydration

Osmotic dehydrated fruits

Sulfite agents

Sulphur dioxide

Sodium sulphite

Sodium bisulphite

Sodium metabisulphite

Potassium metabisulphite

Potassium bisulphite

Potassium sulphite

No SO_2 with SO_2

Osmotic dehydration

Papaya - lycopene pigment (red color of flesh)

Raw materials selection

- optimum variety - optimum maturity

Ripening

Osmotic dehydration

Processing steps

Washing/ Peeling

Cutting/ Deseeding

Osmotic dehydration

Processing steps

Cutting in cube

Dipping in mixed solution of calcium chloride and malic acid

Osmotic dehydration

Processing steps

Blanching

Dipping in mixed solution of sugar and malic acid

Osmotic dehydration

Processing steps

Drying in a Tray Dryer

Osmotic dehydrated air dried Product

Production of osmotic dehydrated mango

Processing steps

Matured mango at optimum ripening

Peeling

Production of osmotic dehydrated mango

Processing steps

Slicing

$CaCl_2$+ Acid pretreatment

Blanching

Production of osmotic dehydrated mango

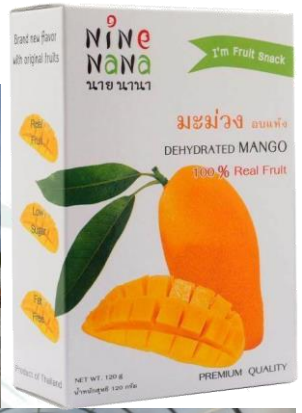
Processing steps

Immerse in osmotic solution (sugar solution)

Osmotic dehydrated slices

Production of osmotic dehydrated mango

Processing steps



Drying using a conventional tray dryer or a greenhouse solar dryer

Production of osmotic dehydrated mango

Major quality criteria impact on quality of osmotic dehydrated product:

Total sugar/Reducing sugar ratio (TS/RS) of osmotic dehydrated mango slices after sugar immersion and prior to the drying process

Sucrose + fructose + glucose (TS)

Fructose + glucose (RS)

TS/RS ratio

Moisture content 12-15%

Factors influencing the quality and shelf-life of osmotic dehydrated mango

Total sugar/Reducing sugar Ratio (TS/RS)

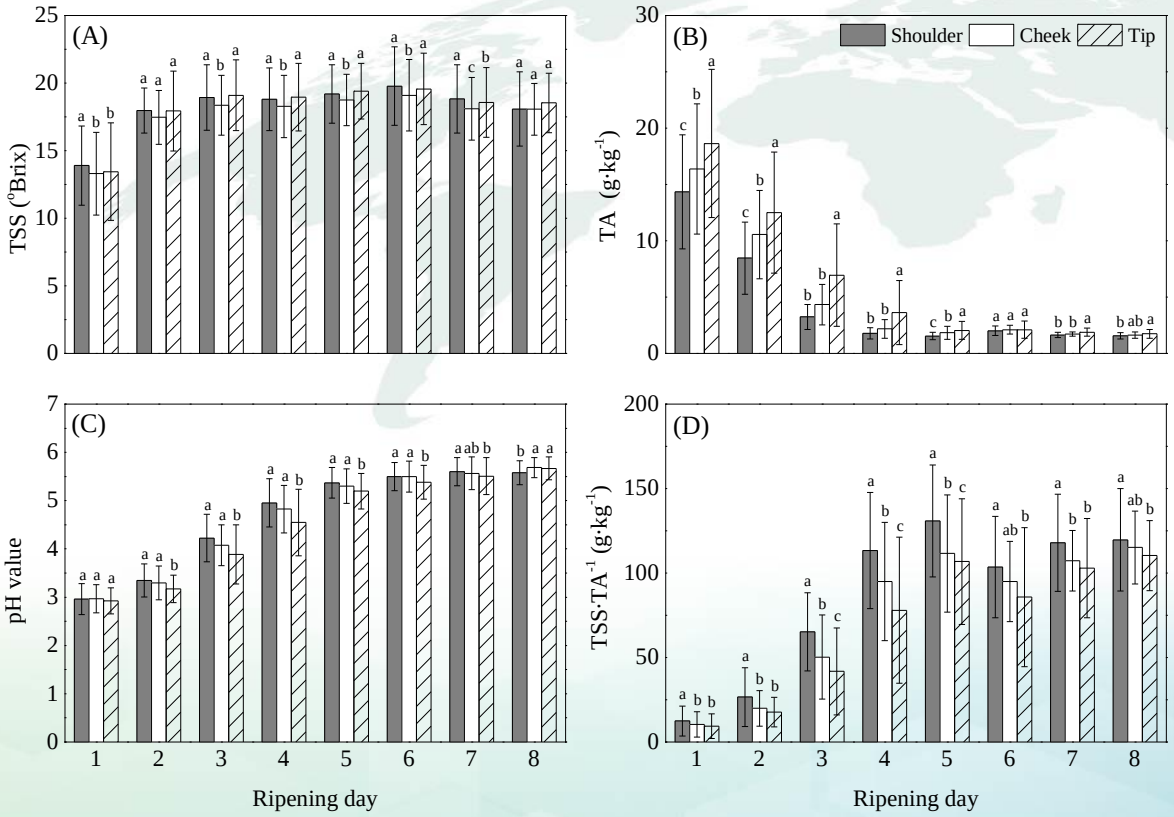
Too high TS/RS ratio, the product will get the thin whilte sugar crystal on the surface and the texture of product will be hard

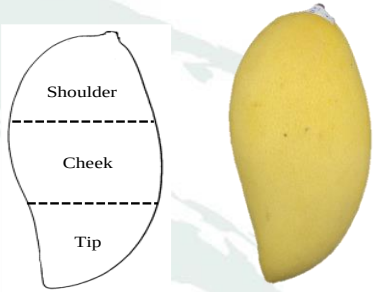
Too low TS/RS ratio, the product will get more sticky and drying time increase

Factors influencing the quality and shelf-life of osmotic dehydrated mango

TS/RS ratio

$$\frac{\text{Sucrose + fructose + glucose (TS)}}{\text{Fructose + glucose (RS)}}$$

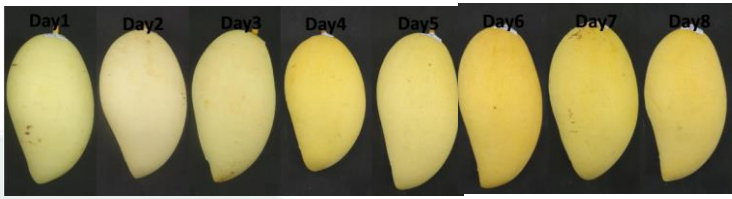




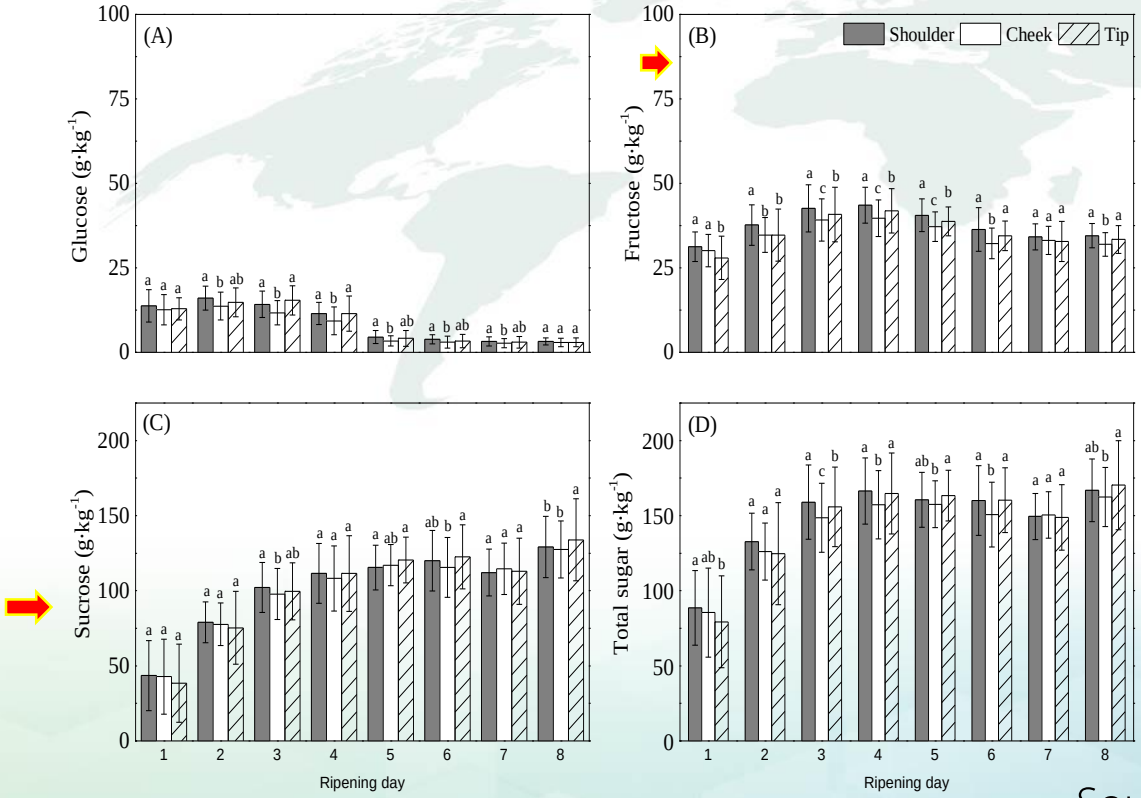
TSS, TA, pH and TSS/TA of Mango cv. Golden Nam DokMai during Ripening

Source: Rungpichayapichet et al., 2015

Factors influencing the quality and shelf-life of osmotic dehydrated mango



D1 D2 D3 D4 D5 D6 D7 D8



Glucose, fructose, sucrose and total sugar of Mango cv. Golden Nam DokMai during Ripening

Source: Rungpichayapichet et al., 2015

Factors influencing the quality and shelf-life of osmotic dehydrated mango

Factor effect on the TS/RS ratio

- pH of the osmotic solution
- Type of sugar used for preparing osmotic solution (OS)
- Concentration of reducing sugar in OS
- Blanching temperature and time
- Amount of acid and the step for adding acid into the OS

Factors influencing the quality and shelf-life of osmotic dehydrated fruits contain anthocyanins

Impact of adding sulfiting agent

Strawberry - anthocyanin pigment (red color)

No Potassium metabisulfite (KMS) + KMS 400 ppm fruit juice

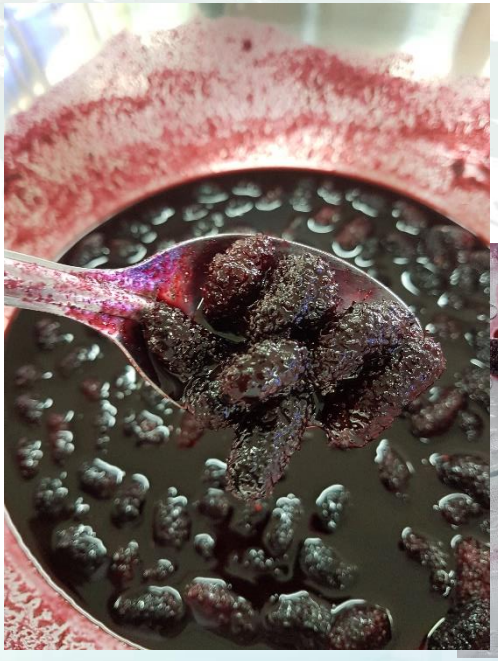
Factors influencing the quality and shelf-life of osmotic dehydrated fruits contain anthocyanins

Fresh mulberry

Osmotic dehydrated mulberry

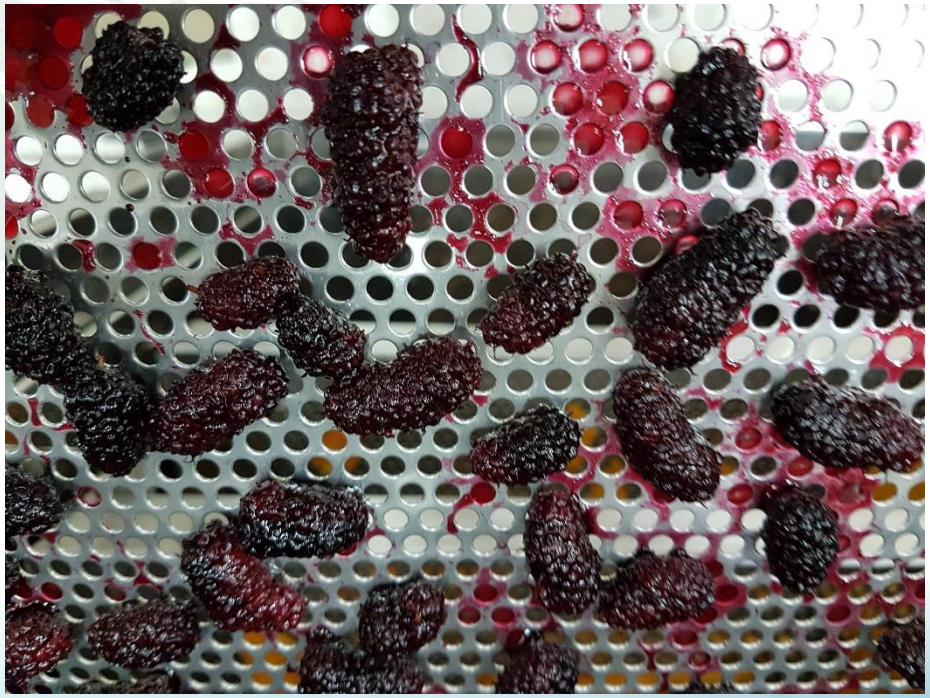
Factors influencing the quality and shelf-life of osmotic dehydrated fruits contain anthocyanins

Mulberry



Factors influencing the quality and shelf-life of osmotic dehydrated fruits contain anthocyanins

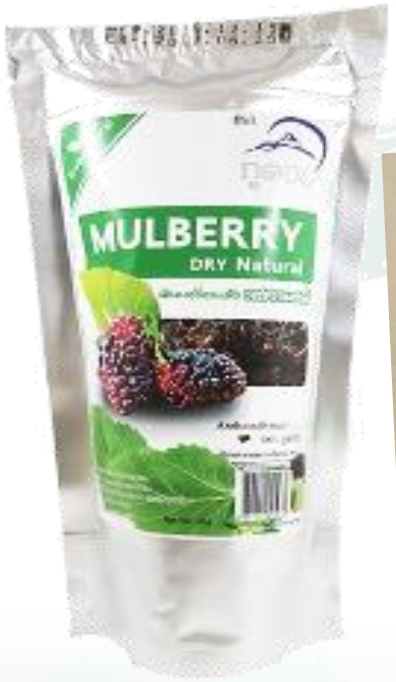
Mulberry



Without osmotic dehydration pretreatment

With osmotic dehydration pretreatment

Factors influencing the quality and shelf-life of osmotic dehydrated fruits contain anthocyanins



Osmotic dehydrated mulberry

Factors influencing the quality and shelf-life of osmotic dehydrated fruits

Degree of ripeness

REFERENCES

Rungpichayapichet Parika, Busarakorn Mahayothee, Pramot Khuwijitjaru, Marcus nagle, Joachim Müller. 2015. Non-destructive determination of β-carotene content in mango by near-infrared spectroscopy compared with colorimeteric measurements. Journal of Composition and Analysis.

THANK YOU FOR YOUR ATTENTION