

**“Pine tapping in Tunisia: New socio-economic opportunities?”**  
Science to Practice Event (Webinar INRGREF)  
September 8-9, 2020

# Early stages of tapping in Tunisia

## *Tapping techniques*

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Partners



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 774632

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# Resin production in the world

- Various production systems
- Sustainability ?
  - Damages to the trees, plantation/natural forest
  - Working conditions, wages

*Chinese*



*American*



*Hugues*



*Mazek*



# **Tapping techniques used in Europe**

## ***Biogemme method - France***



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# Biogemme method – France

## *Drilling machine adapted to tapping*



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# Biogemme method – France

## *Transport equipment for batteries and activator (side)*



# Biogemme method – France

*Transport equipment for batteries and activator (back)*



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# Biogemme method – France

*Hole just after injury*



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# Biogemme method – France

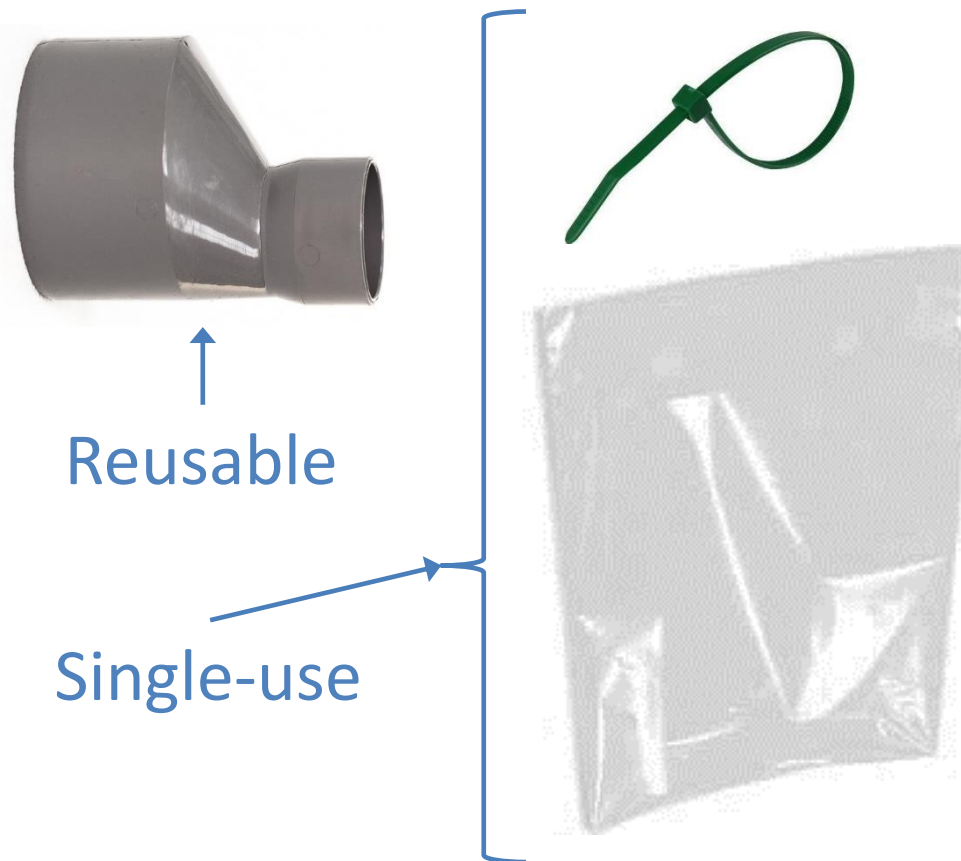
## *Collection connectors installed after drilling*





# Biogemme method – France

## *Commercially available equipment for collection*



# Biogemme method – France

*Tapping over once season*



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# Biogemme method – France

## *Tapped stand*



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# **Tapping techniques used in Europe**

## ***Borehole method - Experimental***



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# Borehole method – France

## *Bark removal and drilling*



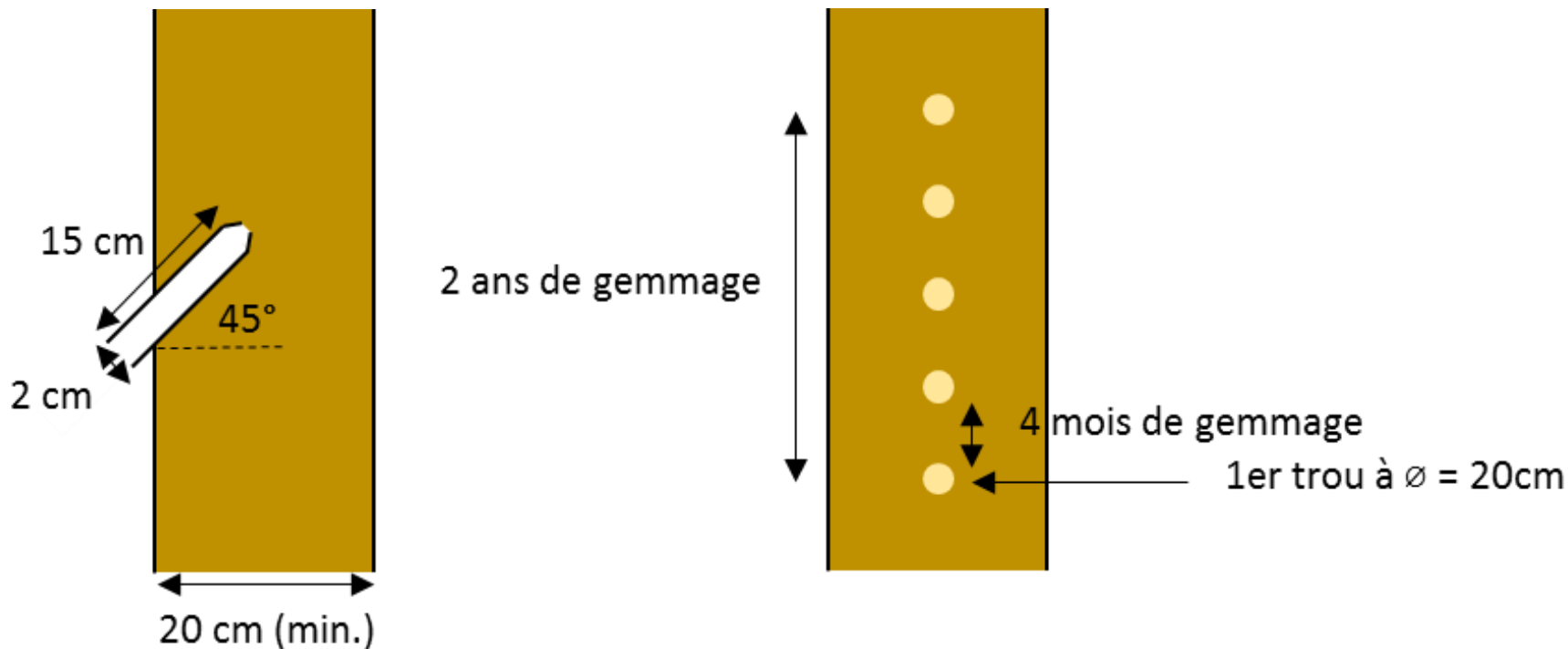
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# Borehole method – Brazil

## *Tapping technique*





# Borehole method – France

## *Application of the stimulant*



# Borehole method – France

## *Flow of resin*



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# Borehole method – Brazil

## *Tapped trees*



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# Borehole method – Brazil

## *Drilling tools used*





# Borehole method – Brazil & France

## *Commercially available equipment for collection*



↑  
Reusable

Single-use



# Borehole method - Spain





# **Tapping techniques used in Europe**

## ***Pica de corteza method – Spain & Portugal***



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# Pica de corteza method – Portugal

*1<sup>st</sup> pass - 1<sup>st</sup> season*





# Pica de corteza method – Spain

*1<sup>st</sup> pass - 2<sup>nd</sup> season*



# Pica de corteza method – Spain

## *Preparation for tapping to death*





# Pica de corteza method – Portugal

*4<sup>th</sup> pass - 2<sup>nd</sup> season*



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# Pica de corteza method – Spain

## *After several years of tapping*





# Pica de corteza method – Spain

## *Stimulant applicator*



# Pica de corteza method – Spain

## *Stimulant application*





# Pica de corteza method – Portugal

## *Resin collection*



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# Pica de corteza method – Portugal

## *Tapped stand*





# Tapping ideas from Brazil



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# Tapping in Brazil

## *Tapping tools (used at low height)*



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# Tapping in Brazil

## *Tapping tools (used in height)*



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# Tapping in Brazil

## *Collection bag*



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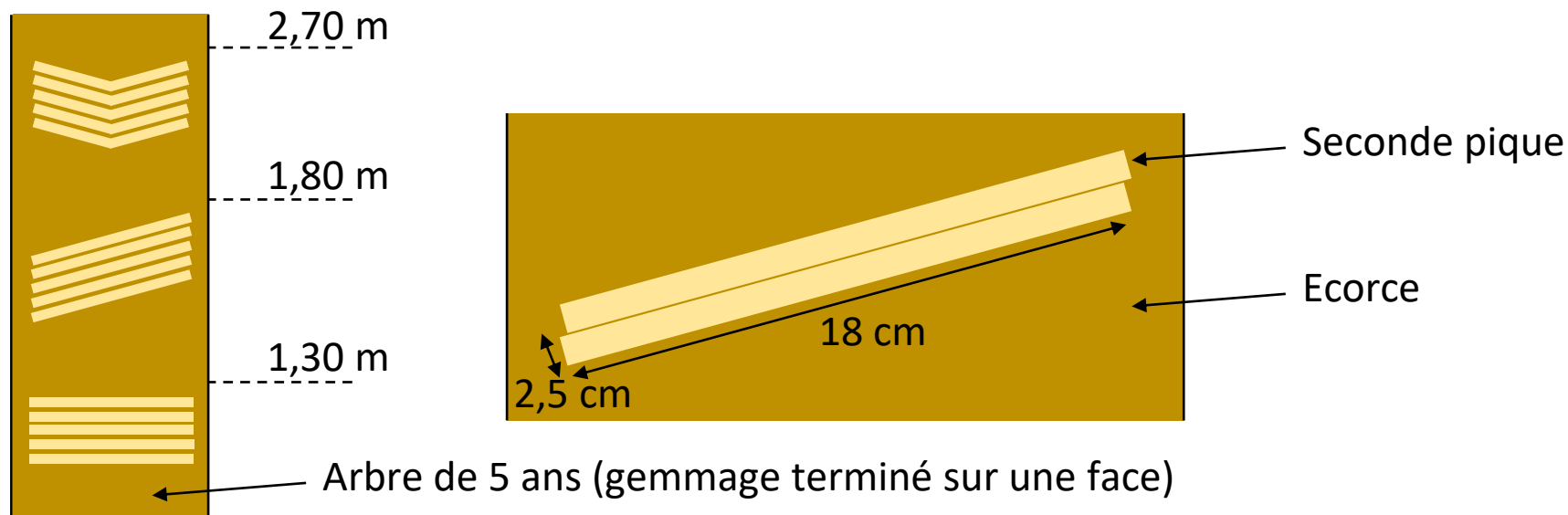
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# Tapping in Brazil

## *Tapping technique*



# Choosing a method: technical and economic aspects



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## Main methods used in Europe – technical aspects

	Biogemme – <i>France</i>	Pica de corteza – <i>Spain, Portugal</i>
Beginning of tapping	25 cm	<b>20 cm</b>
Tapping period	4 to 6 years	<b>25 years</b>
Tapping method	<b>No bark removal</b>	Bark removal
Surface opened at each pass (pique, pica)	<b>90 cm<sup>2</sup> (two holes)</b>	36 cm <sup>2</sup>
Damage to the wood	Very low	<b>No penetration</b>
Acid used	<b>Alpha-hydroxy acid</b>	Sulfuric acid
Tapping tool	<b>Mechanized method</b>	Manual method

# Main methods used in Europe – performance aspects

	Biogemme – <i>France</i>	Pica de corteza – <i>Castilla-y-León (Spain)</i>
Tapping season	4 months/year	<b>8 months/year (reducible)</b>
Number of trees	4500 trees/tapper/year	<b>7000 trees/tapper/year</b>
Surface tapped	12,9 ha/tapper/year	<b>35,0 ha/tapper/year</b>
Quantity produced	14 T/tapper/year	<b>20 T/tapper/year</b>
<i>Productivity per tree</i>	<b>3,2 kg/tree/year</b>	2,8 kg/tree/year ( <i>Castilla-y-León</i> )
<i>Productivity per ha</i>	<b>1120 kg/ha</b>	560 kg/ha
<i>Hourly productivity</i>	<b>20,5 kg/h</b>	13,1 kg/h ( <i>Castilla-y-León</i> )



# Application in Tunisia - Assumptions

	Biogemme	Pica de corteza
Tapping season	4 months/year	<b>8 months/year (reducible)</b>
Number of trees	4500 trees/tapper/year	<b>7000 trees/tapper/year</b>
	Productivity per tree (kg/tree/year)	
Maritime pine	<b>2,0</b>	
Aleppo pine	<b>1,2</b>	
Stone pine	<b>0,9</b>	

# Application in Tunisia - Estimations

	Biogemme	Pica de corteza
	Quantity produced (T/tapper/year)	
Maritime pine	14,0	17,5
Aleppo pine	8,6	10,8
Stone pine	6,0	7,6
	Labor cost (€/kg)	
Maritime pine	<b>0,11</b>	0,14
Aleppo pine	<b>0,18</b>	0,23
Stone pine	<b>0,26</b>	0,33



# International comparison

Country	Tapper salary(€/month) with Brazil	Labor cost (€/kg) compared with Brazil
Tunisia – Maritime pine – Biogemme	60 %	53 %
Tunisia – Maritime Pine – Pica de corteza		68 %
Tunisia – Aleppo pine – Biogemme		87 %
Tunisia – Aleppo pine – Pica de corteza		111 %
Tunisia – Stone pine – Biogemme		126 %
Tunisia – Stone pine – Pica de corteza		159 %
Portugal – Pica de corteza	170 %	308 %
Spain – Pica de corteza	310 %	377 %
France – Biogemme	390 %	639 %



# Choosing a method: advantages and disadvantages



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# Main advantages of each method



## Biogemme

- Production of a better quality resin, no filtration required
- Maximizes the hourly productivity



## Pica de corteza

- Requires little material investments
- Allows the creation of full-time jobs

# Main disadvantages of each method



## Biogemme

- Rapidly uses up the available resource (4-6 years)
- Requires the purchase of more expensive tools (drills and numerous batteries)



## Pica de corteza

- Low hourly productivity
- Work a little harder



# Choosing a method: what are the applications ?



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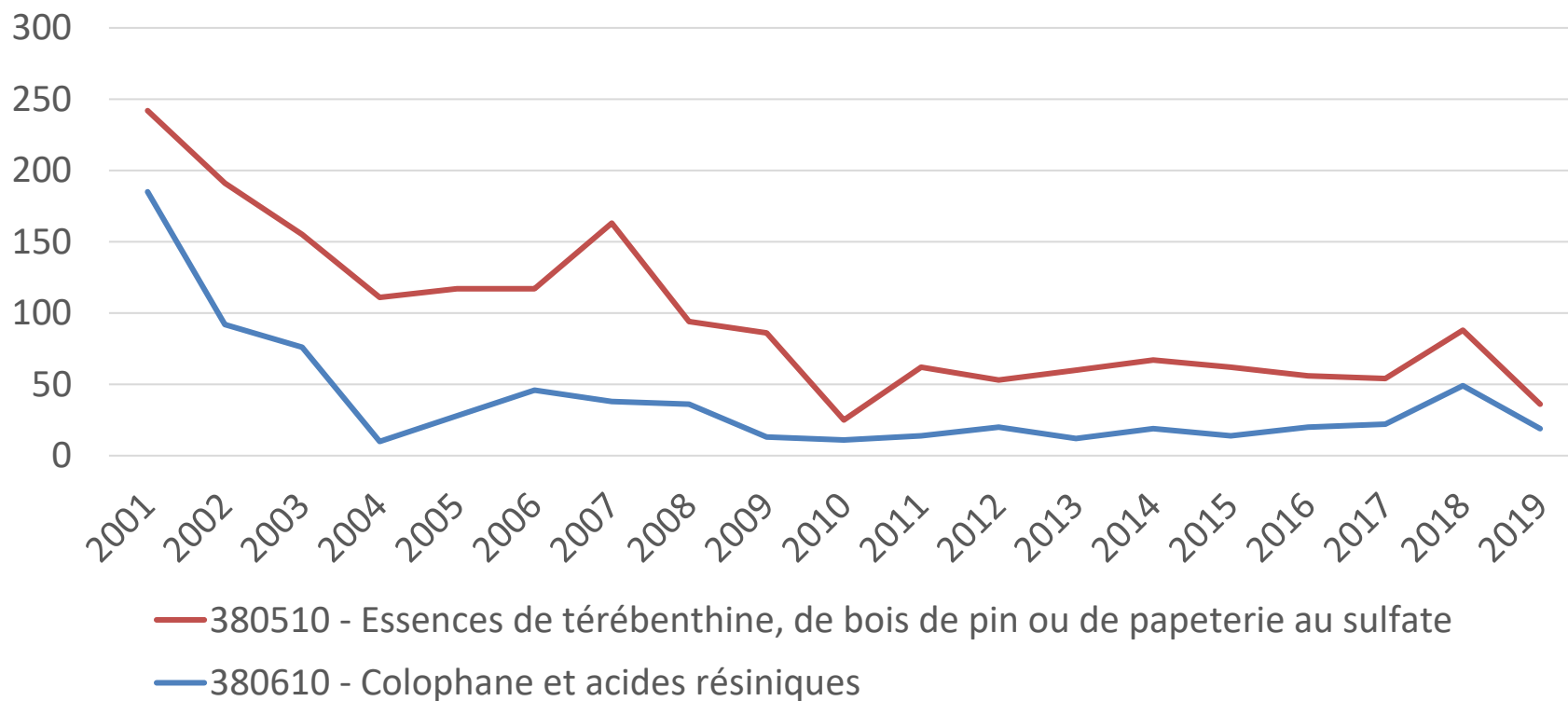
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# 1<sup>st</sup> processing – Plastic bags (uses)

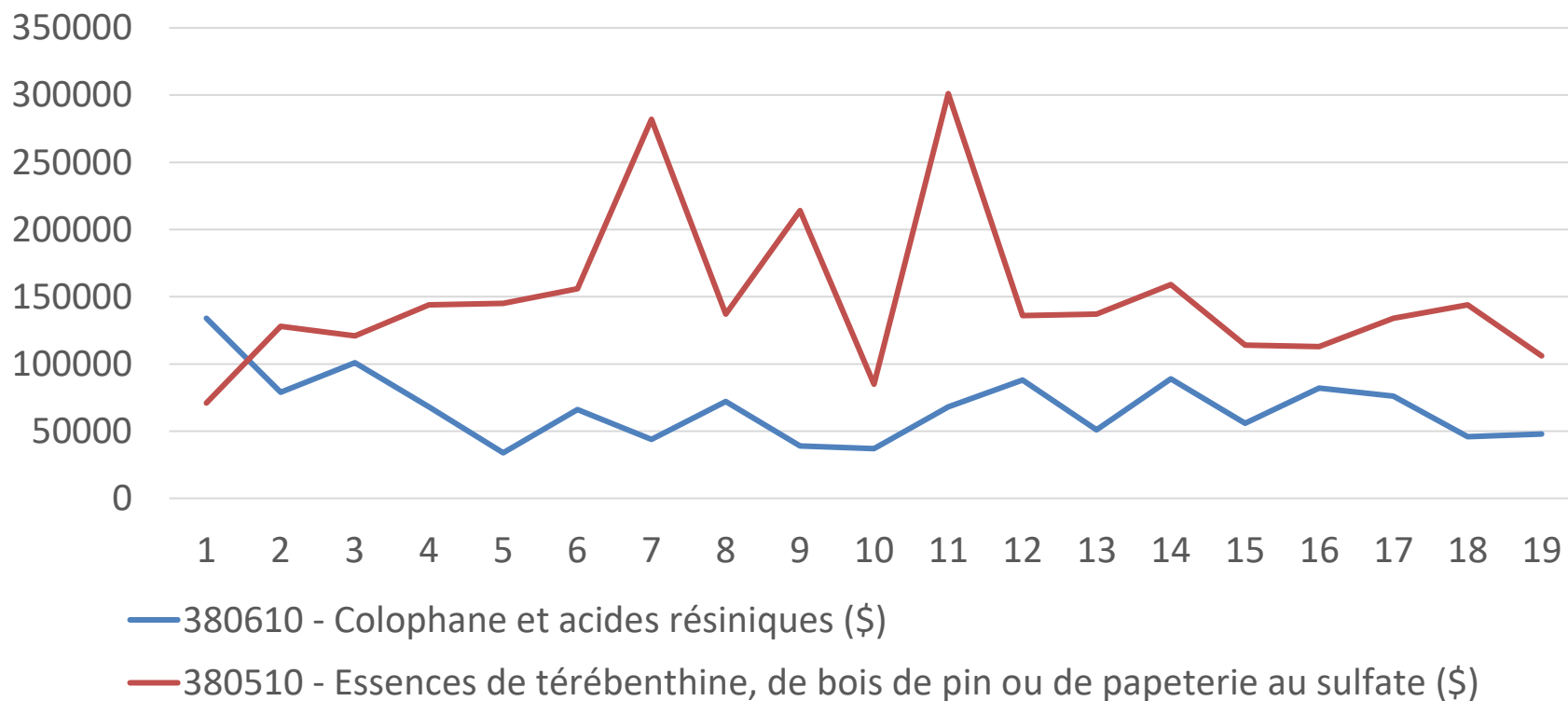
## Rosin and turpentine imports in Tunisia (T)





# 1<sup>st</sup> processing – Plastic bags (uses)

## Rosin and Turpentine imports in Tunisia (\$)



# 1<sup>st</sup> processing – Plastic bags (method)



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# 1<sup>st</sup> processing – Pots



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# Choosing a method: national context



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## Context-related parameters

- Cost of labor :
  - Low : Maximize employment (8 months/year tapping) – **Pica de corteza**
  - High : Maximize mechanisation – **Biogemme**
- Availability of stands :
  - Few : Maximize productivity per tree on the revolution – **Pica de corteza**
  - Many : Maximize hourly productivity – **Biogemme**

## Context-related parameters

- Simultaneous cone production :
  - No : Maximize tapping duration over the revolution –  
**Pica de corteza**
  - Yes : Maximize the yield of both productions–  
**Biogemme, Pica de corteza to death**



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**Thank you for your attention**

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