

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

# Resin tapping in Tunisia: History and valorization opportunities

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## summary

### 1.Introduction

### 2.History of Resin tapping in Tunisia

#### 2.1 The 1960s

#### 2.2 In 2019

### 3. Valuation possibilities

# 1. Introduction



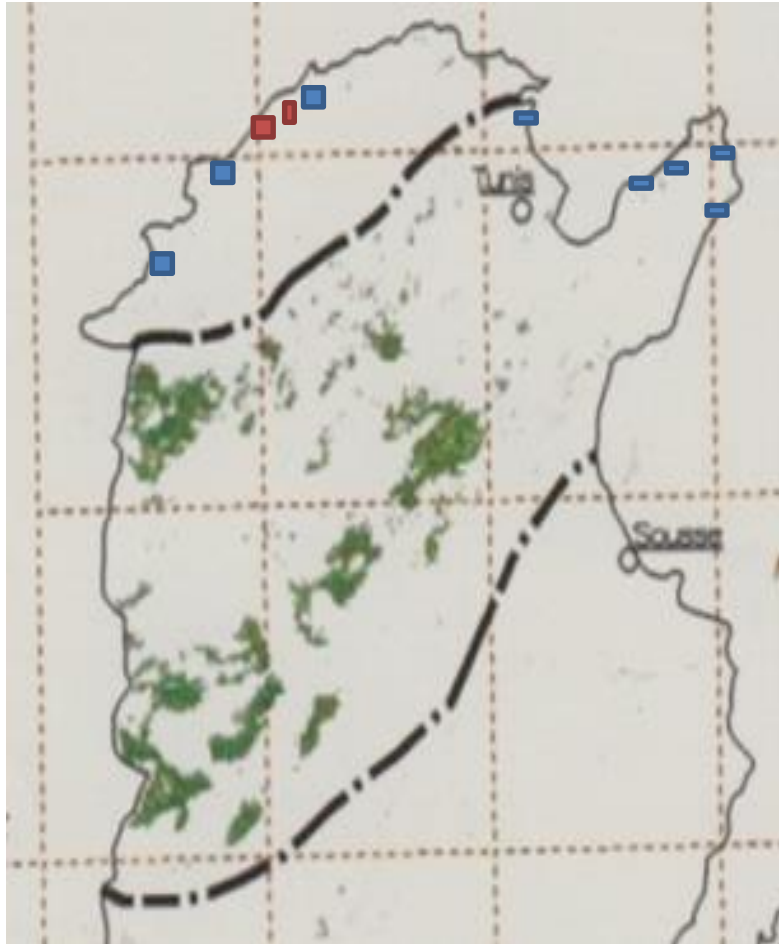
Tunisian forests are mainly coniferous (1.1 million hectares)

Aleppo pine: 362 000 ha

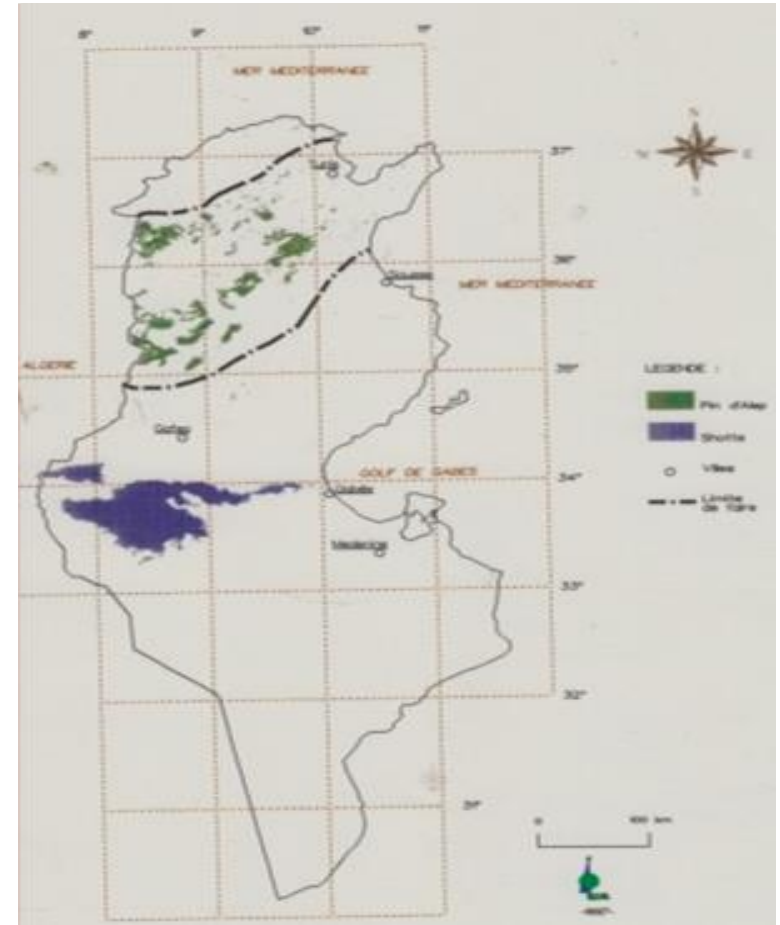
Stone pine: 20 000 ha

Maritime pine: 5 000 ha

# 1. Introduction

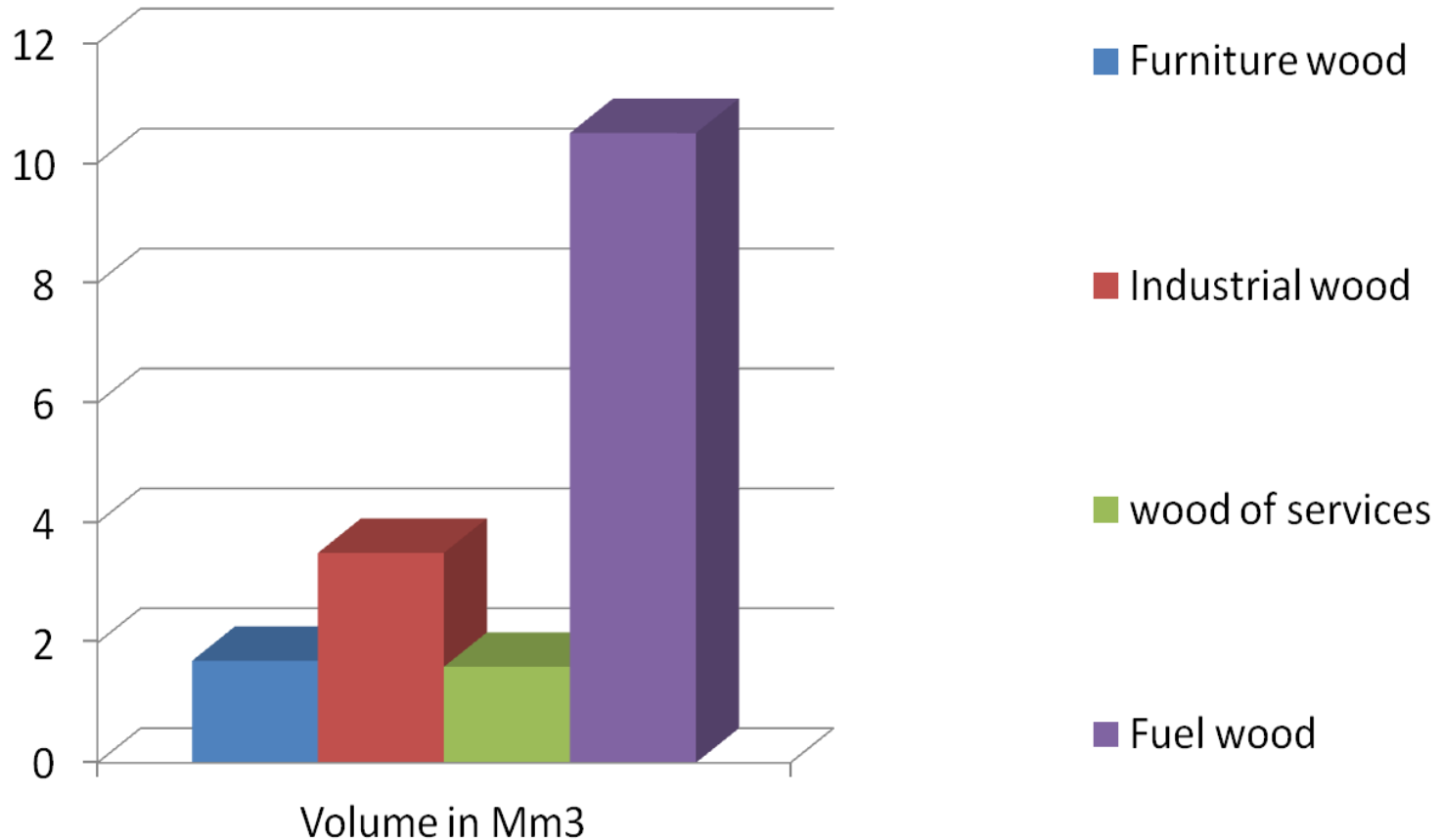


- Stone pine
- Aleppo pine
- Maritime pine



Geographical range of pine species in Tunisia according to the IFPN published in 2010 (DGF, 2010).

## Wood production





## 2. History of Resin tapping in Tunisia



### 2.1 In the 60s (Mr Dahmane-INRF)

- turpentine and rosin are used mainly in the paint industries but also in the soap and paper industries.
- To meet Tunisian needs, these products are entirely imported, leading to increasing expenditure in foreign currency.
- This situation reveals all the interest that the exploitation of the resin in Tunisia could present.

# The possibilities of the Tunisian Aleppo pine forests

- ☐ Conduct of the resin tapping
- ☐ the production possibilities of trees

Tests made in the pilot series of Oum Ejeddour (Arrondissement Forestier de Kasserine) in 1973

## Objectifs

- The production of resin that could be reasonably expected.
- The influence of activation on production.
- the effects of seasonal variations on the flow of the resin.
- The practice of multiple incisions,
- the orientation of the incision,
- the age or size of the resin extracted trees.



## Choice of plot and installation protocol and practical execution

- installation of the tapping test device in plot 13 of the second series of the forest of SAKIET SIDI YOUSSEF,
- Old stand quite beautiful and gardened structure (generation end group in 1975).
- Period of operation: July 1, 1973
- Number of trees: 90
- Tree diameter: 20-57 cm
- Pine tapping method: To death



## Resin tapping technique.

Rectilinear incisions, type "Landaise" are open on 8 cm in width and 15 cm in height from 10 cm from the base of the trunk.

## Treatments carried out.

The treatments focused on:

The number of incisions to open (2, 3 or 4 incisions)

The type of tapping to perform (activated or not activated)

**We thus have 6 types of treatment which are:**

**Treatment 1:** 2 incisions not activated

**Treatment 2:** 2 activated incisions

**Treatment 3:** 3 incisions not activated

**Treatment 4:** 3 activated incisions

**Treatment 5:** 4 incisions not activated

**Treatment 6:** 4 activated incisions

Divide the population of the **90** trees selected into **6** groups of **15** trees to undergo different treatments.



## Device

Lots	A		B		C	
Color of the bands worn on the Lots	black		Red		Blue	
Number of incisions per tree	2		3		4	
Number of trees interested in each lot	30		30		30	
Groups	Non activé (1bN) – Activé (2 bN)		Non activé (1bR) – Activé (2 bR)		Non activé (1bB) – Activé (2 bB)	
Number of trees in each group	15	15	15	15	15	15
Number of incisions in each group	<b>30</b>	<b>30</b>	<b>45</b>	<b>45</b>	<b>60</b>	<b>60</b>

Total number of open incisions **270**





## Exposure of incisions

- **Lot A: (2 incisions / tree): East and West exposure**
- **Lot B: (3 incisions / tree): North-East, South and North-West exposure**
- **Lot C: (4 incision / tree): North, East, South and West exposure**

## Total production over 12 months

Treatments		Production of each group of 15 treated trees (g)
2 incisions	Not activated	4 870
	activated	15 330
3 incisions	Not activated	9 380
	activated	25 070
4 incisions	Not activated	9 430
	activated	18 435
TAOTAL		<b>82 515</b>

The Aleppo pine resin which remains stuck to the walls of the pots after the last heap represents approximately 5% of the total harvest. Thus the actual total production of the 270 open cares is: **86 641 g**



## Average production per tree and per incision

Treatment		average production per tree in a year in g	Average production per incision in a year in g
2 incisions	Not activated	325	163
	activated	1022	511
3 incisions	Not activated	626	209
	activated	<b>1672</b>	<b>558</b>
4incisions	Not activated	629	158
	activated	1229	308

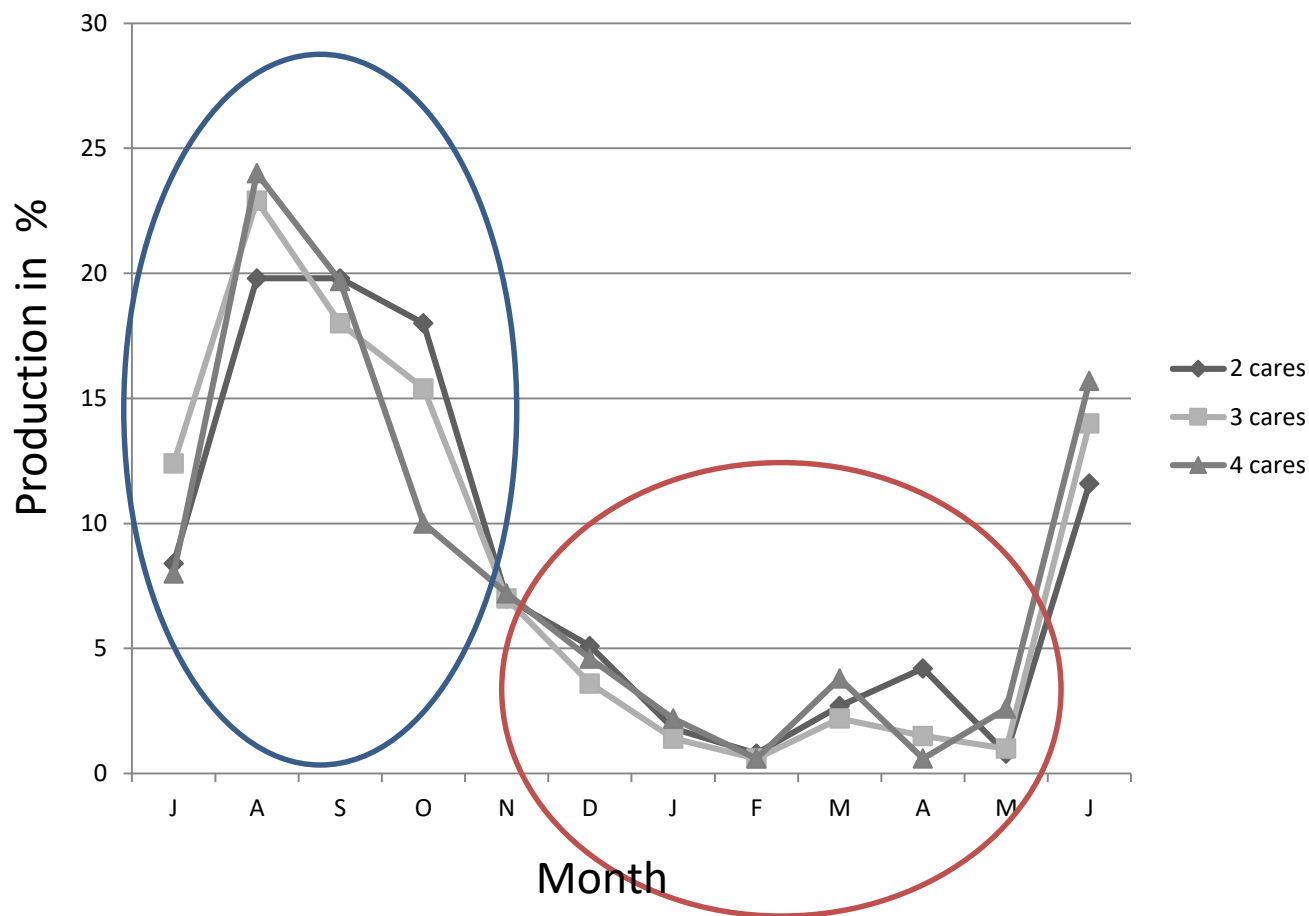
## Influence of chemical activation

Treatment	Not activated		Activated		Coefficient of multiplication of production by chemical activation
	Poids (g)	(%)	Poids (g)	(%)	
2 incisions	4 870	5,5	15 330	18,5	3,14
3 incisions	9 380	11,5	25 070	30,5	2,67
4 incisions	9 430	11,5	18 435	22,5	1,95
Total		28,5		71,5	

The analysis of the quantities produced according to the number of open incisions and according to the type of tapping (activated or not activated) shows that chemical activation with sulfuric acid multiplies by 2 to 3 the yield of trees in terms of production of resin.

## Percentage of resin production during every month (Activated resin tapping)

month treatment	Jui	Aôu	Sept	Oct	Nov	Déc	J	F	M	A	M	J	Total
2 cares	8,4	19,8	19,8	18	7	5,1	1,8	0,8	2,7	4,2	0,8	11,6	100 %
3 cares	12,4	22,9	18	15,4	7	3,6	1,4	0,6	2,2	1,5	1	14	100%
4 cares	8	24	19,7	10	7,2	4,6	2,2	0,6	3,8	0,6	2,6	15,7	100 %



## Percentage of production per period

Period / treatment	June to October	November to May
Trees 2 incisions	77,6 %	22,4 %
Trees 3 incisions	82,7 %	17,3 %
Trees 4 incisions	77,4 %	22,6 %



## Influence of the age of the tree and its dimensions

Diameter class in cm	Trees extracted by 2 incisions		Trees extracted by 3 incisions		Trees extracted by 4 incisions	
	Not activated	Activated	Not activated	Activated	Not activated	Activated
20	264 g	536 g	369 g	585 g	600 g	680 g
25	418	918	516	822	640	959
30	460	1300	741	2131	612	1844
35	440	840	825	2700	592	-
40	-	-	-	-	860	-
45	-	2560	-	2760	-	-
50	-	-	-	2415	-	-
55	-	-	1575	-	-	-

## 2.2 resentes Studies (2019)





## Resin tapping technique with vase closes and activated extraction



- The incision was performed using a screwdriver with a hole saw to obtain a perfect round wound with the diameter of the elbow.
- To extend the duration and the quantity of flow, we use a special acid-based product in gel form.



## Parameters studied

- ☐ Incision depth
- ☐ Number of incisions per tree
- ☐ Exposure of the incision



North exposure

East exposure

South exposure

West exposure

**Average yield of Maritime Pine resin with acid spray and acid free.**

species	Yield with acid (ml)	Acid-free performance (ml)
<b>Pin maritime</b>	$271,83 \pm 10^a$	$51 \pm 12^b$

**Average resin yield of three species of pine with acid spray.**

Species	Yield (ml)
<b>Pin maritime <sup>a</sup></b>	$271,83 \pm 10$
<b>Pin d'Alep <sup>b</sup></b>	$168 \pm 7,09$
<b>Pin pignon <sup>c</sup></b>	$118,33 \pm 7,63$



## Distillation yield of pine species

Rendement (g)		
Species	Turpentine	Rosin
<b>Pin maritime</b>	1,1 <sup>b</sup> ± 0.2	21,3 <sup>a</sup> ± 0.2
<b>Pin d'Alep</b>	1,05 <sup>b</sup> ± 0.01	20,87 <sup>a</sup> ± 1.17
<b>Pin pignon</b>	1,3 <sup>a</sup> ± 0.1	19,46 <sup>b</sup> ± 0.2



## Yield according to exposure

Species	Exposure	Yield (ml)
<b>Pin maritime</b>	South	$73 \pm 11,26$
	East	$46 \pm 13,52$
	North	$1 \pm 1,73$
	West	$2,9 \pm 2,59$

### 3. Valuation Opportunities

- Lack of companies dealing with resin extraction in Tunisia
  - No major scientific research on the topic
  - No existing resin-tapping or distillation community.
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- The economic interest of the exploitation of the resin is obvious, given the by-products obtained by distillation from this natural material, and which are turpentine and rosin.

- As a non-timber forest product, the exploitation of pine resin abundant in Tunisian forests (50% of the forest area) can contribute to a bioeconomy and can generate additional income for forest populations.
- Tunisia, by its geographical situation which is part of the Mediterranean rim characterized by its climatic diversity, offers a flora particularly rich in plants constituting an inexhaustible reservoir of biologically active substances.
- Resin extraction has a great interest in the development of pine forests by the prospects of production supply and by the jobs that could provide.

# Thank you



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