THE BOREHOLE METHOD

The ‘Borehole method’ involves the radial drilling of the base of the trunk. The oleoresin is obtained by directly inserting recipients into the borehole; this prevents the oxidation and reduces the volatile fraction. Indeed, one, two or three drill holes are made into the base of the trunk—the number of holes vary according to the tree diameter; hereafter, the recipients—which size is proportional to the expected quantity of oleoresin—are inserted. When the oleoresin is no longer flowing out (in our tests, within 5 days at most), it is collected and bores are sealed by using cork stoppers.

Preliminary studies show that restrictions on the resin tapping time are not due to a shortage of the resin flow, but to the crystallisation of oleoresin in the bores. The possibility of consecutively drilling every few days is being studied. The efficiency of the turpentine of this oleoresin is superior to the efficiency of the oleoresin collected in traditional recipients. In addition, based on the results of the qualitative analysis, a higher proportion of some relevant volatile compounds is observed; however, the study of a higher sample number must confirm these results.

FINDINGS

Turpentine and resin rates based on the resin tapping method

Bark Streak Tapping System

The possibility of resin tapping before the final cutting has been studied considering the management plans and features of the Galician mountains; thus, the result is an added value that is also complementary to the profit obtained from timber use. When simultaneuously using two opposite faces, the output per face is lower if compared to the use of just one face; however, the output per tree increases. The system of tapping using a wide face (16 cm) –with two faces– got a higher output per tree and did not show any deterioration signs in the mass.

During the last two years, the months were the output was higher are June, July and August. To adapt the time spacing between the tappings according to the output of each tapping is an alternative that should be studied.

Borehole System

Even though the output is higher with the Bark Streak method, the Borehole method—with the use of closed recipients—improves the gathering of volatile fraction with a high added value.

In the analysed samples, the percentage of turpentine is higher than with the traditional Bark Streak Method. Furthermore, the possibility of not applying chemical stimulants can provide the local market with a natural and eco-labelled product.

The extraction and recollection process is held in a short period of time (in a few days); therefore, this could allow the resin tapper to make this system compatible with other activities. In addition, the traditional pine timber use in Galicia is preserved if the drilling is performed at the basal level of the trunk.

BIBLIOGRAPHY


Contact: Centro de Investigación Forestal de Lourizán (‘Lourizán Forestry Research Centre’), Marín Motorway, km 3.5. 36153 Pontevedra (Spain). Phone: 986 805000 https://lourizan.xunta.gal/en
The Mountain Model for Resin Tapping Use in Galicia

According to the features of the Galician mountains, the compatibility with the timber use and previous studies carried out by the IEFE, pine forests close to their final cutting are the most convenient for resin tapping, which should be done 2 or 3 years before the abovementioned cutting. When these pine forests are at the end of shift, the average diameter of the feet of pines uses to exceed the 30 cm; tree density is lower, and bush vegetation is generally less present.

More than 250 reviews about public auctions of P. pinaster timber that took place in communal forests of the provinces of Pontevedra and Ourense were studied. The average tree harvesting mass had the following values:

<table>
<thead>
<tr>
<th>Features</th>
<th>4.3</th>
<th>3.61</th>
<th>197</th>
<th>0.6</th>
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<tbody>
<tr>
<td>Average Area (ha)</td>
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<td></td>
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</tr>
<tr>
<td>Density (feet/ha)</td>
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<td></td>
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</tr>
<tr>
<td>Volume of Wood with Bark (m³/ha)</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Average Feet Volume (m³)</td>
<td></td>
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</tbody>
</table>

Records and Introduction

The Centro de Investigación Forestal de Lourizán (‘Lourizán Forestry Research Centre,’ also known as CIF Lourizán) has been installing different trials since 2015; the aim is to establish the possibilities of Pinus pinaster Ait. resin use in Galicia.

Galicia has not traditionally been a ‘resin-producer’ region. However, the rise of its use at the beginning of the 20th century favoured the research on the resin exploitation possibilities in Galicia since the early 1950’s to the early 1970’s; this research was conducted by the former Instituto Forestal de Investigaciones y Experiencias (IFIE) and it explored the possibilities of the resin use in the abovementioned Spanish region. The sector crisis and the lack of tradition stalled these tests as well as the promotion of the resin exploitation in the region.

Nowadays, the resin exploitation has been reactivated in Spain. In Galicia, where the interest in resin uses has appeared, there are 217,281 ha of P. pinaster’s pure stands, according to the 4th Spanish National Forest Inventory. As noted by the IEFE in its research, Galicia’s resin tapping model must be different from the model established in the rest of the Iberian Peninsula. This is due to the fact that Galician mountains present some features related to the weather, the terrain, the shrub vegetation, the tree density or the canopy size; in addition, timber and resin exploitations may conflict in those areas where timber is the main stand.

In those areas where there is a resin tapping tradition, the applied method entails the bark tapping and some chemical stimulation. Resin tapping starts when the pine has reached a diameter > 30 cm. The work unit is called mata (‘stand’), with an average of 4,000-5,000 feet; its density varies from 150 to 250 feet/ha and the area is around 16-26 ha; these figures ensure the obtaining of a satisfactory work output to the resin tapper.

When using the ‘a ouiro’ tapping method, the tree is tapped for 25 years, approximately; five faces are wounded (one face every five years) and five indent cuts are made in each one of the faces (one per year). Another possibility is using the so-called ‘a mort tapping,’ which implies the simultaneous tapping of all the possible faces of the tree. This method allows the tapping to be carried out more than 3 meters high, but slows the tree growing. The timber is depreciated; this devaluation affects at least the basal stem-wood where the tapping faces were carved. Therefore, wood chipping would be more appropriate than sawing for this kind of timber.

These trials are known as ‘Cunningham’ or ‘Brazilian’ paste. It has a lower concentration of sulfuric acid and the stimulation is more gradual; therefore, it enables the extension of the resin tapping during the 14 days set between the tappings.

Testing and Goals

The research conducted by the CIF Lourizán is focused on the evaluation of resin tapping performed during the last few years of tapping previous to the final cutting. Therefore, two plots were established to undertake the research: one in Caldas de Reis (province of Pontevedra, Galicia) in 2016 and another one in Maceda (province of Ourense, Galicia) in 2017. The main goal is to analyse different variations of the traditional Bark Streak tapping method, as well as to study other pioneering methods such as the Borehole method. In both systems, the compatibility with the timber use is taken into account. Thus, this research aims to:

1. Assess the production ranges of the Bark Streak and the Borehole tapping methods.
2. Analyse the influence of dendrometric and environmental variables, as well as those from technical alternatives (if in need), on both tapping methods. These alternatives are, for instance, the number, disposition and size of the tappings and drillings.
3. Compare the quality of resin extracted by using an ‘open recipient method’ with the quality of resin obtained by using a sealed recipient.
4. Assess the potential loss of tree growing in tapped trees and how tapping affects timber uses.

Features of the mass tapped in the research

(The standard deviation is included between brackets)

<table>
<thead>
<tr>
<th>Location</th>
<th>2016</th>
<th>2017</th>
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<tbody>
<tr>
<td>Average Area (ha)</td>
<td>4.3</td>
<td>4.3</td>
</tr>
<tr>
<td>Density (feet/ha)</td>
<td>361</td>
<td>361</td>
</tr>
<tr>
<td>Volume of Wood with Bark (m³/ha)</td>
<td>197</td>
<td>197</td>
</tr>
<tr>
<td>Average Feet Volume (m³)</td>
<td>0.6</td>
<td>0.6</td>
</tr>
</tbody>
</table>

Output varies according to the type of treatment (narrow-wide face, 1-2 faces), the tapping year and the number of performed tappings. Trees with two faces obtain an average output per face lower than trees with just one face. Nevertheless, the total output per tree is increased.

The lower values of the average output per tree are akin to the values obtained in the research conducted from 1950 to 1970 about P. pinaster in Galicia (the range being from 2 to 3 kg of ockerian per tree). However, the highest average value—obtained by using two faces of 16 cm during the 2nd tapping year, as well as a campaign of 15 tappings—exceeds the 5 kg per tree. During the first two years, June, July and August were the months with the highest output.